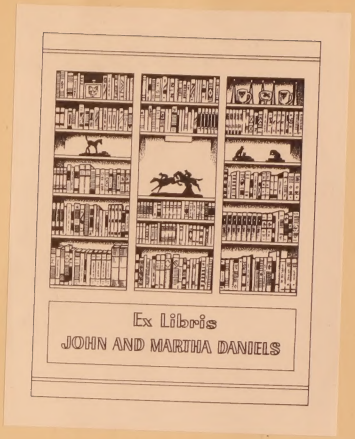

Ex Libris
JOHN AND MARTHA DANIELS

GAME BIRDS

VARIETIES OF PHEASANT: *Top left,* MONGOLIAN (*P. Mongolicus*). *Top right,* JAPANESE (*P. Versicolor*). *Centre,* MELANISTIC MUTANT (*P. Tenebrosus*). *Below, left,* OLD ENGLISH (*P. Colchicus*). *Below, right,* CHINESE (*P. Torquatus*).

Pheasants : A Diagram of Varieties.

GAME BIRDS

REARING, PRESERVATION AND SHOOTING

Written by HUGH B. C. POLLARD, *Author of THE HISTORY OF FIRE ARMS, etc., and illustrated by* PHILIP RICKMAN

PUBLISHED IN LONDON BY EYRE AND SPOTTISWOODE (PUBLISHERS) LIMITED, AND IN BOSTON AND NEW YORK BY HOUGHTON MIFFLIN COMPANY
MCMXXIX

Printed in Great Britain

PREFACE

EVERY thirty years or so brings about changes in all kinds of sport. These are seldom immediate revolutions, but rather slow processes spread over a sequence of years. The sport of shooting is very definitely conservative, but nevertheless it has changed very much during the last thirty years, and many of the ideas and standard textbooks of an older generation are definitely out of date. We in England have to deal with a period when agriculture has undergone great changes, labour has become vastly more expensive, and our whole countryside has changed. We have to adapt old methods and employ new ones. It is the purpose of this book to give some guidance on the up-to-date methods of establishing, rearing, and shooting game.

In the United States a change has also come about. The vast range of free natural shooting enjoyed by the last generation has been very much reduced. In some cases this is due to overshooting and out-of-season shooting, which was common in the past. In other cases it is due to the reduction of land to farms and other inevitable causes inseparable from the advance of Western civilisation. The tendency is for the conditions of sport in the more heavily populated sections of the U.S.A. to approximate more closely to European standards than before. The State itself acts as the preserver and conservator of game, and to a large extent replaces the great landowner of our Continental and British systems. It is in theory at least the trustee for the sportsman and the birds. The wealthy estate owner and the private shooting clubs which correspond to our English syndicate shoots second the efforts of the State, but no legal control or private endeavour can compensate for changed conditions. It is improbable, even with rigid conservation, that native American game birds such as quail will ever be so plentiful in all areas as to meet the yearly increasing modern demand for adequate sport. The situation

has been met by the introduction of the pheasant, which, since its original turning down in Oregon in the eighties, has extended its range to an astonishing extent, and is now commonly distributed over many states.

The general conditions of game shooting in the United States are not yet as a whole as formalised as our own, but in many areas where agricultural, climatic and local conditions are similar to those in this country, there is an increased recognition of the need not only for increasing the existing local stocks of birds, but developing the shooting on lines which resemble ours.

The American sportsman likes a good sporting shoot with birds coming fast and high. It is only a matter of time before our British methods of showing the birds will be adopted in so far as they can be adapted to meet American conditions. In the same way the intensive rearing systems used here will be used by private groups to supplement and increase the existing wild breeding stock.

It is not beyond probability that other European game birds will, in spite of past failures, be successfully introduced to America to benefit our brother sportsmen. Today far greater attention is being paid to the scientific side of game conservation and the biology of our game birds. As greater knowledge is gained the horizon of possibilities is extended. Once we know the real reasons why birds thrive in some environments and fail in others, not only is the potential success of acclimatisations far more hopeful, but estates and areas can be developed to their greatest game-holding extent.

The conditions of game shooting in a country largely determine the type of gun which is most popular and most practical for that country. Modern shot-guns are not only better than those of thirty years ago, but the principles governing their design and use are far better understood. There is, however, still a wide variation in detail and efficiency, and a chapter on guns will not be out of place in a book on sport.

Thirty years also involves certain changes in our mental attitude. The older generation certainly preserved game; today we not only preserve but conserve our game resources. It is very necessary that this point should be more fully recognised, and that the small farmer no less than the landowner should realise that wild stock is not inexhaustible, and that the annual toll of the game taken by hunters and sportsmen anywhere in the world must only

be the surplus over and above breeding requirements. Conservation of migrant fowl is a matter of international importance.

The older generation usually assumes that sporting conditions inevitably change for the worse. It is by no means certain, and I prefer to think that we have fluctuations rather than any considerable setback. In general, shooting has adapted itself extremely well to the changed conditions.

Today in England we find more gun and game licenses are taken out than ever before. The pheasant is being reared not only in greater numbers, but with greater intelligence, and our stock of home-breeding duck and, I believe, woodcock are increasing. Migrant wild fowl are believed to be decreasing owing to intensive netting, market shooting, and decoying on the European mainland, but steps are being taken to arrive at some measure of international agreement to control the seasons during which they may be taken or sold. Our native partridge has admittedly decreased in numbers of late years. This is due to a combination of circumstances, including succession of unfavourable seasons, the reduction of arable land to pasture, and an increase in parasitic diseases spread by poultry and wild birds. A succession of fortunate seasons would, however, do much to restore the situation and replace the stock our present conditions can successfully carry, and it is to be hoped that the present shortage may be little more than a passing phase.

The change in economic conditions since the war has led to the growth of syndicate shoots, for relatively few of our landlords can now afford to maintain great shoots purely for their own pleasure and that of their personal friends. This has led to a closer study of the economics of shooting and a more scientific control of the rearing field. The rent of grouse moors in Yorkshire and Scotland has risen steadily, and improved measures of moor management are showing a good return. Many a Scots laird would be a poor man were he dependent on the agricultural value of his moors alone.

It is difficult to assess the enormous value of shooting to the country as a whole. It is one of the greatest amenities of the country dweller, and people who condemn sport for sentimental reasons seldom reflect that but for hunting and shooting how little woodland we should have left in the countryside. Forestry by itself is not remunerative, but the combination of forestry and game pays handsomely. The whole of our wild life (with the exception of

predatory birds and animals) benefits more from the protection accorded to game than from any other cause. It keeps the woods quiet and the vermin down.

Today a fast car will take us fifty miles or more to a shoot, and we can be back home again before dusk has closed to darkness. We may have shot to half a dozen guns a bag which would seem incredible to our grandfathers of the days of muzzle-loaders, but after all has the sport itself really changed or are we misled by the circumstances of our sport, that general speeding up which is characteristic of a mechanical age and a restless century? I think they had the same feeling once before, for listen to old Isaac Bickerstaffe singing a century and a half ago:

Let gay ones and great
  Make the most of their fate,
From pleasure to pleasure they run!
  Well, who cares a jot?
I envy them not,
  While I have my dog and my gun.

For exercise, air;
  To the fields I repair
With spirits unclouded and light;
  The blisses I find
No stings leave behind,
  But health and diversion unite.

The glory of the moors in mid-August, partridge on the golden stubble in September, the reds and bronzes of the covert side in November; blue sky and racing cloud overhead and frost tang in the air; birds rising well over the screen trees and coming down wind at a swerving forty miles an hour; snipe rising from the bogs of a lonely Irish mountain, duck flighting in before a north-easterly gale over the mud flats and salt marshes of an estuary—what other sport can give you these?

HUGH B. C. POLLARD.

September, 1929.

CONTENTS

PAGE

PREFACE v

Changes in sport in the present century. Recognition of importance of conservation. Rôle of game in agriculture, estate and national economics.

GAME BIRDS

CHAPTER

I. PHEASANTS 1

History and natural history of the pheasant. Increase in the U.S.A. Importance of the crossed strains. Pheasant varieties considered in relation to sport. Considerations concerning wild and hand-reared stock.

II. PHEASANTS 15

Rearing pheasants. Eggs, pens, management systems, details of rearing and feeding. Technique of rearing fields.

III. PHEASANTS 41

Avoidance of disease. Diseases.

IV. PHEASANTS 51

Woodland and wild or rough shoots. Covert shooting proper, lay-out of coverts, screen belts, forestry considerations. Driving and showing pheasants high over guns. Holding and attracting pheasant stock. Beats and the management of shooting parties.

V. PARTRIDGES 67

Natural history, varieties, natural habits of the bird. Human control, partridge rearing and preservation. The Euston system, development and maintenance of stock. Pairing, nesting, nest protection, watering, feeding, etc. Partridge shooting, driving, walking up, butts, stands, wind and ground, etc.

CHAPTER PAGE

VI. The Grouse 87

Red grouse, capercailzie, ptarmigan, and associated birds, natural history. Development of grouse shooting. The grouse cycle and the influence of disease. Moor management. Grit. Scotch system, Norwegian system. Acclimatisation.

VII. The Grouse 105

Grouse shooting. Dogging moors, driving moors, butts, economics of shooting, details of equipment, shooting ponies, etc.

VIII. Snipe and Woodcock 119

Natural characteristics and varieties of snipe. Snipe marshes. Jack-snipe migration. Breeding habits. Drumming, weather and food conditions. Cock, natural history, early pairing and breeding. Cock coverts, a good fall of cock. Land movement. Improving cock coverts. Shooting, special loads, etc.

IX. Duck 133

Leading varieties of edible sporting duck. Natural history, feeding habits. Duck breeding. Improving natural duck resources. Nesting, feeding. Shooting raised wild duck. Natural wild duck migration movements. International agreement on market, shooting, etc.

X. Duck, Geese and Waders 147

Coast duck, wild geese, curlew, shank, and waders in general. Shore shooting, marsh preservation, wild fowling in general.

XI. The Gun Room—I 161

Modern game guns: evolution, essential requirements. Guns for special purposes: wild-fowling, trap, etc. Short versus long barrels, under and over guns, single triggers, detachable locks, and detail refinements. Stock measurements, gun fitting. The gun-room equipment: cabinets, cases, cartridge magazines, details required for the season, cartridges, special loads, etc.

XII. The Gun Room—II 175

Shooting-ground practice. Field hints and tips.

LIST OF PLATES

1.	Pheasants: A Diagram of Varieties	*Frontispiece*
2.	Pheasants: "Over the Tall Trees"	FACING PAGE 9
3.	Pheasants: Beginning the Glide over the Guns	17
4.	September: Partridges with a Frenchman Leading	69
5.	Capercailzie: "Over the Tops of the High Trees"	89
6.	Black Game at Glen Tromie	97
7.	Grouse at Forest of Gaick above Loch an Sielacht	107
8.	Snipe "Drumming" in the Spring	121
9.	A Fall of Cock. November Woodcock Resting in the Marram Grass	129
10.	Woodcock "Roding" at Dusk	131
11.	Mallard, Teal, and Pochard	135
12.	Wigeon and Pintail on the Flats	149

GAME BIRDS

I

PHEASANTS

GAME BIRDS

Chapter I

PHEASANTS

THE pheasant appears to have been especially invented in order to provide not only the best of shooting, but one of the finest table birds. He is good to shoot and no less good to eat, and above all other birds he represents a sound economic proposition. You can, within limits, manage pheasants to suit your ground, your shooting, and your pocket, and this cannot be said with any approach to accuracy of any other game bird. People who write about motor-cars have coined a horrible word " controllability," which really means satisfactory response to handling. There is this quality in the pheasant. It is probably the most plastic game material we have to deal with, and there is so much ignorance about it that we find pheasants about twice as expensive as they ought to be.

Practically speaking we poison about a third of the birds we hatch with horribly unsuitable food, cooked carbohydrates like biscuit meal, and we have solidly ignored the advances made in scientific knowledge in all other branches of husbandry.

What, you may say, have pheasants got to do with husbandry ? My answer is that if we have a true perspective, game is a crop or an annual increase in stock, and that it is just as much a farmer's business as any other aspect of the land.

There is far too great an acceptance of the idea that game rearing is a rich man's hobby, and that expense does not matter. This is wrong in every way. More game, cheaper game, common sense and economy are the points which are really important. Shooting cannot ever be accessible to the multitude, for crowds and shooting are mutually incompatible, but it can be and should be a moderate as well as a wealthy man's sport.

The pheasant is a very adaptable creature, for man has extended his natural range from Asia and Eastern Europe right through Western Europe, over wide zones of America and down to New Zealand in the Antipodes. It is doubtful if we have really touched the half-way mark in pheasant exploitation, for there are many varieties, and sub-species of pheasants which are admirable sporting birds, but suited to a narrower or more equable range of climate than we enjoy. The American with hill country has yet to experiment with Reeve's pheasant. There may some day be a spell of relief from politics, when other pheasants of the Himalayan varieties may be introduced into Mexico and spread in time up into the States. There are delightful prospects of acclimatisation of all kinds, but it must be admitted that they are purely theoretical. Until someone really tries there is no knowing what particular brand of nematode worm or local predatory animal may wipe out the pioneers, for after all, an acclimatisation scheme depends on ecological and biological factors just as much as on a suitable climatic environment.

Today we can send either pheasant eggs or live birds nearly anywhere we want. Transport has speeded up, we know more about food, and difficulties which existed in the past have been entirely overcome.

The history of the coming of the pheasant to Britain is still obscure. Actually the native habitat of our original black-necked pheasant, *Phasianus colchicus*, was the river Rion, then called the river Phasis, in the district of Colchis near the Black Sea, hence the generic and specific names. The bird, however, occurs in a wild state as far west as Dalmatia, and there is abundant literary evidence, mainly gastronomic in trend, which shows that he was well known to the ancient Romans. On the strength of these classic associations rather than on any sound evidence as yet forthcoming, we have been taught to believe that the Romans introduced the pheasant to Great Britain.

If they did, the motive is obscure. You cannot get the best of pheasant shooting with a bow and arrow or a sling. The country in Roman times was infested with every kind of vermin in the shape of wolves and predatory beasts, and the only logical conclusion is that if the pheasant did come over with the Romans he was brought in at great expense, not in the interests of our local avi-fauna or from any idea of æsthetic pleasure, but simply to put the game strain into cock-fighting.

This notorious and degrading form of sport was highly popular with the garrison, and though my interest in matters archæological is slight, and my *joie de vivre* is not accentuated by old brickbats in museums, I have an idea that somewhere or other, probably near Newcastle-on-Tyne, there is a brick-bat or a mortuary tablet of some cheery old pagan with a native gamecock under his arm. It remained in memory because of its human interest. If you ever spend a winter in Northumbria you will sympathise with the garrison of Hadrian's Wall.

As a matter of fact, I still doubt the success of the Roman introduction. When the natives rose and wiped out the Italian settlements they did not bother much about the goods and chattels which remain to be dug up by archæologists, but they almost certainly collared all the livestock, and most probably ate it. If we want further substantiation of this we have only to look at the succeeding form of art popular in Saxon and Celtic Britain. It is a highly intricate and conventionalised pattern of birds, beasts and scroll-work. Now the pheasant is a beautiful bird and a lovely design, and if he had been common it is pretty certain that he would have appealed to the eye of the Celtic draughtsman. He is so perfectly adapted to the job; but so far—and I have kept an open and inquisitive eye on the point for many years—I have never found a pheasant in early art. Peacocks, yes; eagles, yes; even rabbits—but no pheasants, in spite of their glorious suitability to the style. I may be wrong, there may exist unmistakable pheasants, but I have not yet seen one or found any expert on the subject who has. Admittedly the expert in this subject does not look upon these bird forms with the eye of one seeking information about one particular bird, but this gap, the unexplained absence of the obvious for some centuries, needs a bit of filling before we can really accept the tradition of the introduction of the pheasant to Great Britain by the Romans in pre-Christian times.

The slender evidence we possess suggests a much later introduction. The pheasant, admittedly one of the best table birds there is, appears to have been associated with the Church. Judging by the little time it has taken to become successfully established in the United States and New Zealand, but making allowances for contemporary slowness in transport by human agency, we can assume that it must have been introduced at least half a century before it is first mentioned.

The first accepted reference is a detail of the scale of rations allotted to a Canon's household by King Harold in 1059, quoted by Harting and Tegetmeier: " Erant autem tales pitantiæ unicuique canonico; a festo Sancti Michaelis usque ad caput jejunii, aut xii merulæ aut ii agansea (? ganse—geese or wild fowl or agacé magpies) ant ii perdices, *aut unus phasianus*, reliquis temporibus aut ancæ, aut gallinæ."

The evidence adduced takes us back before the Roman Conquest of 1066, and if we assume that the introduction was probably through the efforts of those good missionaries who established the Church and Church property in England, this is the more probable line of events. The bird was soundly established not only in England but in Ireland by Tudor times, and seems to have been introduced into Scotland prior to 1594. It still flourishes in Scotland, but is relatively rare in Ireland because of systematic poaching and disregard of the close season.

The original bird introduced to Britain was the type we now call the " Old English Blackneck." This bird is still called the Common Pheasant (*Phasianus colchicus* Linnæus), but it is by no means the most common pheasant of our countryside, for it is mixed with other sub-species, and it is doubtful if a perfectly pure strain exists. Our usual pheasant is a hybrid between three or four species, and is denoted by game farmers as an " ordinary " pheasant in order to avoid confusion with the scientific name Common Pheasant, which applies solely to the " Blackneck."

The next introduction was the Chinese or Ring-necked Pheasant. The exact date of its introduction is unknown, but it probably came in with the development of the tea trade with China during the first half of the eighteenth century about 1740. The introduction was slow, but here and there colonies of ring-necked pheasants were in existence as wild game birds by the close of the eighteenth century. The extension of the bird to the North and Scotland came a good deal later, and despite the influence of eggs from game farms and the influence of our cross-bred ordinaries, I believe that many wild Scotch birds still show far more of the original old Blackneck strain than is common among birds in the South of England. The mixing of the blood between Blacknecks and Ringnecks does not appear to have resulted in a Ringneck dominance until relatively late in the nineteenth century. Amid a wealth of

sporting illustration the Ringneck is not usually portrayed as the conventional bird of the time, and only emerges definitely about the late seventies and early eighties. We shall not, I think, be far wrong if we date the general effect of hybridisation at about the period of the introduction of the earlier sporting breech-loaders some sixty to seventy years ago.

There was, however, a third sub-species, the Japanese or Versicolour Pheasant, which was introduced in 1840, a gift of a pair from the King of Italy to the Earl of Derby being the foundation of the stock. Within a few years of its establishment as an aviary bird it was developed into perhaps the most usual of the pheasants to be found in parts of East Anglia. These cross-bred Versicolours did not, however, breed true, and at the end of a relatively short period of years the Versicolour strain bred out, and the Ringneck type dominated. The fact that the plumage change did not prove resistant does not preclude the possibility that some other genes or factors from the Versicolour strain may not persist in our ordinaries of today.

From time to time the Versicolour has been reintroduced, but it is doubtful if it has exercised such a powerful influence on our birds as the last strain which has been added to our admirable mongrel. This is the Mongolian (*Phasianus c. mongolicus*), introduced by the late Carl Hagenbeck, and then intensively reared by Mr. C. E. Russell at his game farm in the first years of the present century. The Mongolian is a fine bird, but the cross Mongolian is far better, and I believe that the influence of the strain during the last thirty years has added valuable factors of resistance to climate and disease to our ordinary birds.

Of late years the influence of the Mongolian blood has been more in evidence in the plumage of birds shot, but it is not by any means as unmistakable as the Chinese strain. Pure or perhaps it would be preferable to say nearly pure, Mongolian stock is carried by nearly every game farm of importance, and the admixture occurs in most game farm eggs, for the Chinese × Mongolian or Blackneck × Mongolian first cross cock is a favourite with breeders.

These four strains have contributed to our bird, but within the last few years we have developed a sub-species which is a new type. It is a dark-plumaged bird known for the moment as a melanistic mutant (*Phasianus mut tenebrosus*), and it is claimed by some authorities to breed true, though this is doubted by others who hold that it has appeared and disappeared before.

The pheasant is a bird which is singularly productive of local varieties or sub-species, and where the systematist of an earlier day would maintain the existence of sixteen or more species of true pheasants, today Mr. William Beebe, whose great " Monograph of the Pheasants " is the standard work, divides the whole genus of pheasants into two species, the Asiatic Pheasant, *P. colchicus*, and the Japanese Pheasant, *P. versicolor*.

The latter stands alone, although it is possible that it has a sub-species of the melanistic type (*P. versicolor*, *tenebrosus*), but *P. colchicus* has twenty-four and possibly more sub-species or local variations. Of late years there has been a reduction of redundant sub-species to local forms or variations, but only a few of the whole range of birds are of any importance to sportsmen.

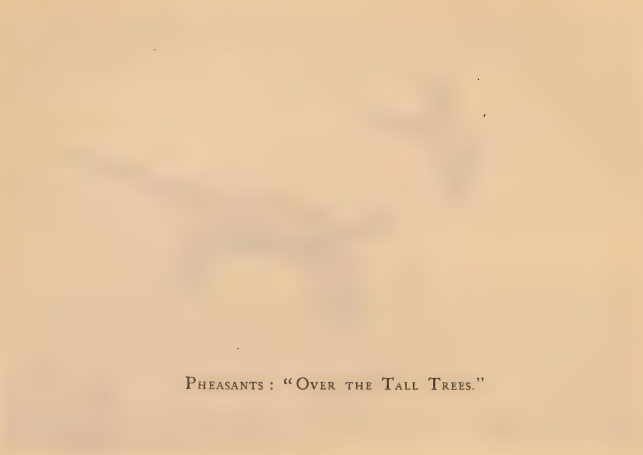
Lord Rothschild, no less an authority than Beebe, holds that there is only one species of true pheasant, and that Versicolour is a sub-species like the rest.

The appearance in large numbers of the dark mutant has led to great discussion whether it is a hybrid or a mutant. The balance of opinion based, it may be said, entirely on plumage characteristics, is that there is no Versicolour blood in the birds, and that when they " throw back," as they occasionally do, the chicks are like a Blackneck × Ringneck cross. On the other hand, the cock mutant does in many ways resemble the general appearance and colouration of a Versicolour cock, although the flank feathers are not marked with the indented bar of the Japanese birds, but the straight V of the others.

These dark birds were known as far back as the eighties, but it is only during the last fifteen to twenty years that they have been bred. The cycle given by C. G. Talbot Ponsonby is as follows. The Liphook Game Farm sent eggs to General Roundell, who later exchanged with Captain J. H. Preston, in Yorkshire, who sent birds to Talbot Ponsonby, who has bred them for fifteen years and gave birds to the Zoological Society, where they have been bred for some years. It is only during the last four or five years that they have become widespread. They have often been sent out by game farms as cross Versicolours.

The odd dark bird has been ascribed by the credulous to the result of connection between cock grouse and pheasant hen. Indeed I have been told, rigorously told, that the cock grouse had been seen to visit the pen every day. My suggestion that this union must be legitimised by the priest of the parish before I would believe it nearly led to bloodshed.

Pen-Pictures of Old Time Days



Pheasants : "Over the Tall Trees."

The rather more knowledgeable defined these darkies and their grouse-like hens as cross Versicolours, and it is possible that they will still prove to be right. Norfolk, where these mutants first appeared in the eighties, had been predominantly Versicolour in the fifties. The reintroduction of the Versicolour dates from the mid-nineties, and it is possible that there is after a long alternation of generations an after-kick showing in general colour rather than plumage detail. There is a difference of opinion between the geneticists and the ornithologists about this, but the game farmers say that they have mutants from both Versicolour and non-Versicolour blood.

The interesting thing is that however it came about (and the Japanese birds are after all not yet very thoroughly understood), it is a new kind of bird which breeds, at any rate for a time, true enough to produce such a variation that had it occurred in Tibet or somewhere would immediately have been hailed as a true new sub-species. The fact that it happened under our noses in England, and we still do not know much about it, is perhaps the best example of what the species pheasant is capable of doing in order to achieve his infinite variety.

The elements in our ordinary English pheasant are, as we have seen, Colchicus, Torquatus, Versicolour, and Mongolicus. Later perhaps we shall have to add Mut Tenebrosus, or Darkie, to coin a less ponderous title. If you go to a pheasant farm you will see a few pens of segregated aristocrats—almost pure lines—and a larger proportion of cross-bred gentry "first cross," and a herded democracy of ordinaries. A wealth of personal experience is necessary before you can even guess at a hen's parentage, but the distinctive features of the pure cocks are fairly easily determined.

Colchicus has a purple-black neck shading to green, with no white ring at all. Torquatus has a white ring which should go all round, Mongolicus has the white ring broken at the front collar-stud where the gold chestnut of the upper breast joins the iridescent neck, and is much broader, and Versicolour is a metallic green, not gold-bronze, bird, with no neck ring at all. The mutant has not the indented Japanese flank feathers. Seen pure it is easy, but when we come to look at the serried rows which mark the bag of the last stand, identification, as they say in the police reports, it is not so easy. The ring basis no longer holds good, for the blood is mixed.

The eye and the rump are perhaps the next best points. Colchicus has a yellow-brown eye in keeping with his neat uniform, and a dark maroon rump. Torquatus has a white eyebrow and a grey-blue, almost lavender-coloured rump, and the same kind of colour on the wings, where those of Colchicus are bronze-brown. Mongolicus has a very light pale yellow eye, white patched wings, and is a larger bird than the others. Versicolour crosses are still dark metallic in the overlay of ordinary feathering, and the flank feathers bear an indented bar like a Japanese war fan in place of the straight bar or lancet of the others. No mutant cross is known; they appear to breed clean, normal, or mutant.

The very light hens are usually Mongolian or first cross Mongolian, and have very light yellow eyes; very dark hens are either versicolour or mutant; in the case of the latter the rump is usually grouse plumaged. In the past very light bleached-looking birds, either cocks or hens, were often called Bohemian pheasants. They are, in fact, albinistic mutants and not a true sub-species, but simply sports.

The importance of these cross breedings is the different sporting characteristics of the birds in their pure state. The Blackneck is a smallish bird of good sporting qualities and able to resist climate well. He is, however, rather more pugnacious than the ordinary.

The Ringneck or Chinaman is slightly larger, rather more lethargic, and, according to some authorities, rather more difficult to rear when pure. Believed to be a more prolific layer, the Mongolian is a much larger and lighter-coloured bird, and more peacefully inclined than either of the foregoing. To this we owe his reputation for straying, for he is easier noticed, and often feeds well away from covert, whence he has been driven by older and more pugnacious cocks of the other varieties. It is extremely weather resistant. The Versicolour is a very fast, rather small, and very sporting bird, but a poor layer, and suffers badly from cold winds rather than wet.

In their crosses many of the disadvantages of the pure strains entirely disappear. First cross Chinese and Mongolians are splendid birds, and far the best for the table. First cross Blackneck × Mongolian are rather lighter, but give a quicker rise. So far as driving is concerned in a well laid out shoot there is, I think, little to choose between them. First crosses between either Mongolian

or Blackneck and Versicolour are also excellent sporting birds and prolific. The cross between ordinary hens and a Versicolour cock is perhaps the best combination for the private owner who wishes new strains in his stock without any sacrifice of sporting capacity.

There are a few other pheasants which have been tried as sporting birds, but which have for some reason or other never made headway. It is probable that these might do well in the U.S.A., where a wider range of climatic conditions and a higer degree of freedom from disturbance prevail. They are birds which might do well on wild range, where they fail under the slightly more artificial conditions inseparable from a thickly populated country.

First is the Prince of Wales Pheasant (*P. c. principalis*), a bird rather like Colchicus, but with white wing coverts. It is wilder and shyer than our birds, but has never succeeded here. Lord Fisher tried a pair in the pen at Kilverstone, but wild cock pheasants attacked them (they were wing brailed), and nearly plucked them bald. It is supposed to do well in damp, swampy places, is prolific and a markedly strong flier, a point which needs caution when it is brailed for the pen.

Next the Reeves Pheasant (*P. Reevesii*), which has a splendid tail and is often over six feet in total length. It has done fairly well where introduced, but is a hill bird, and though it will cross with other pheasants the hybrids are infertile. It is not a prolific layer, but gives very sporting shooting.

The Golden Pheasant (*Chrysolophus pictus*) is mainly an aviary bird and quarrelsome, but might be established and thrive on its own. Lastly there is the Monaul (*Lophophorus refulgens*), which looks like a cross between a peacock and a turkey, and its related Impeyan (*Lophophorus l'puysii*), which is even gaudier. I have seen them as aviary birds in England, but never heard of their breeding or being really successfully set out in semi-wild state. They are, however, good hardy sporting birds in their native countries, and might some day be adapted in a suitable environment.

So far as my experience goes, I have not been able in over twenty years to detect any appreciable difference between the sporting qualities of the hybrid "ordinary" and selected strains of first cross birds. It all depends on how they are shown, and provided the birds are handled properly, an equally good result should be obtained. Where the ground is difficult or badly laid out, or the

handling of the birds is wrong, there may be a disconcerting tendency for Mongolians and Chinamen to walk forward or run to the wire, where Blacknecks or Versicolours will take to the wing well back. Low birds are usually badly handled birds, and an alteration of the strain will not materially improve matters. Very high birds—and at mountainy shoots one sees them at their best—show as a rule a higher proportion of Blacknecks than the ordinary East Anglian or Midland flat ground shoot. I do not think that the Blackneck flies higher than the others, but he appears to be the natural wild pheasant of that particular kind of country.

A variation of the kinds ordered from a game farm is, I think, wise. It adds to the variety of the bag, and what is more important helps to separate the degrees of consanguinity. Special pure birds are excellent for breeding experiments, and should not be turned out but kept penned—it is waste to shoot them, for they are expensive, as breeding back to a true line takes time and money. The estate owner will do well to invest from time to time in a few special cocks for the pen—Mongolians for bulk, Versicolours for speed, Chinamen to fill the eye, and Blacknecks for an antidote to excessive domesticity.

Let us suppose that a new estate has been taken, and to begin with it is a matter of putting the place in order and simply increasing wild stock rather than rearing. One way is to set out young hens to covert and hope that they will settle down. Experience indicates that where ten birds over the guns come from hand rearing, four birds per hen is about as much as turning down stock usually returns. In a less crowded area and under better climatic conditions six to eight birds may be counted on.

As in most things, a compromise may be more effective, and a few weeks spent by the hens in pens with ample food, and above all no disturbance before they are turned out to covert, may yield a higher return. This involves a sequence of small batches and attention to covert feeding. Very often the low yield of turning down is almost entirely due to the fact that birds are released in poor condition into a strange environment infested with vermin. An estate which has been neglected is usually overstocked with vermin, and the wild stock of pheasants usually includes a number of veteran cocks who are not particularly potent, and who are vindictively quarrelsome and drive the younger more fertile cocks away. The introduction of pheasants to a pheasantless country is

often extremely successful, but the similar turning down of more birds in a country already sparsely tenanted seems to go wrong.

It is an axiom of preservation that cocks should be shot down as close as possible at the end of the season. Some keepers hold that it can be overdone, but my experience all suggests that adequate cocks will survive, and others will come in even when you think that the last cock on the place has been exterminated. The spread of pheasants in country to which they are newly introduced is probably largely influenced by this factor. The old birds drive the younger generation to new fields. This, though important as an ecological factor in America is exactly what one does not want in the heavily populated pheasant covert in Great Britain. The amorous propensities of the cock pheasant are such that if we pen hens with taped wings in a wire aviary with an open top, wild cocks will come in to the hens. In true breeding experiments it is essential that the pen should be wire roofed, for it is common experience for a keeper to find that his selected young caught up cocks with taped wings are unmercifully bullied by invaders from outside.

In Great Britain the average practice on a big shoot is to catch up a certain number of wild hens early in the season and pen them in an aviary. The yield of eggs is usually supplemented by an equal quantity of bought eggs from a reputable game farm. This insures an annual change of blood.

A pen or aviary for pheasants is usually a fixed erection of thirty feet square for each six hens and one cock. Wire netting about eight feet high surrounds the sides, and the lower three feet should be screened with corrugated iron let three inches into the ground. It prevents visitors alarming the birds and keeps out vermin. A shelter of sticks and brushwood provides a nesting or laying centre.

A number of these cubicles can be provided in rows with a narrow alley-way giving access to the doors to each. One allows a hundred eggs to each pen of six birds. More will be laid, but too late to be useful, and an excess should always be provided. Twelve six-bird pens is about right for a thousand eggs.

Many estates favour the permanent open pen system, which is a large pen in which a hundred or more birds are turned loose together. Both systems have their advocates, but the temporary small pen system is, though costlier,

far better. It is very difficult to sterilise a permanent large pen, and even with proper liming of the ground and creosote and limewash to the enclosure walls, if infection once comes in, it is very difficult to be sure that you are rid of it.

The cubicle pens moved every year to fresh ground is vastly preferable, and if the sides are made of wire netting on light timber frames, they are easily disinfected when taken down and easily erected on a new site next year. The best and most reliable game farm in England uses low pens rather like chicken runs of double height roofed in with netting. These are moved weekly. It is expensive in labour and in ground, but it is worth it. They always have sound, clean birds, and if any touch of disease comes in it is localised and stamped out before it can affect the others.

Catching up pheasants is a simple affair. The keeper feeds in covert at regular places which the birds soon get to know. Early in the New Year he erects simple cages of wire netting, leaving the ends open, and throws feed under them. The birds soon get used to them, and feed beneath the netting and in the small wired-in space. When he wants to catch up birds he fits wire netting ends to these small cages, which point inward like a V and have a small opening.

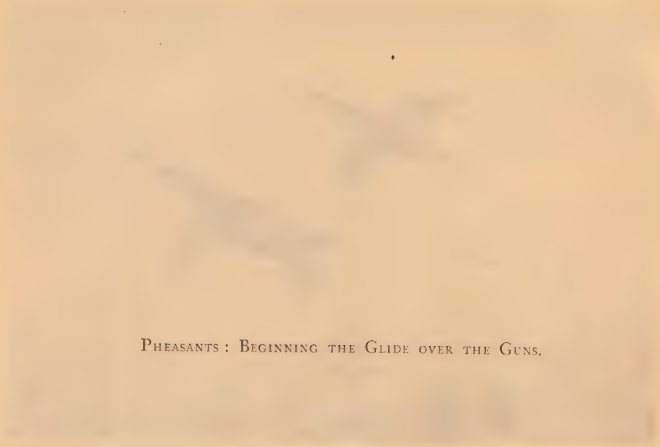
A good trap is five to six feet long and two feet wide by two feet six inches high. The roof is movable or foldable. The curved V ends are fitted to the stakes, and the birds go in to feed, run round, and seldom find their way out by the opening. It is simple, but the birds are fools.

The traps are visited and the birds taken with the minimum of disturbance. Any that are in poor condition or old are released, and the selected birds taken to the aviary or pen where their wings are brailed or taped so that flight is restricted. Once a month the tape should be transferred to the other wing.

The stock of hens and cocks thus secured are brailed and penned and fed regularly and well watered. This is the nucleus stock for the eggs for the following season.

II

PHEASANTS



Pheasants : Beginning the Glide over the Guns.

Chapter II

PHEASANTS

THERE are three ways of getting a stock of eggs for the season's rearing:

(1) They may be collected from wild nests.
(2) They may be laid by aviary hens.
(3) They may be bought from game farms.

The first method, collection from wild nests, is not very satisfactory, for a very large proportion of the eggs are failures. A proportion of these are "clears"—that is to say, unfertilised eggs—but a greater number are frost-chilled or naturally weak, and it is seldom that the hatch exceeds 60 per cent.

In careful hands the results from aviary or penned hens give a very much higher yield, but there are one or two important points to be observed. The cocks and hens need to be caught up early so as to get accustomed to their surroundings, and they need special feeding. A ration containing veterinary cod-liver oil in the proportion of half a teaspoonful per bird per day has excellent results in producing strong early eggs. It assists the egg store of the hen, and is a valuable tonic to the cock. If it is mixed with a little bone meal we also provide a useful phosphorous and calcium reserve.

There are other factors to be remembered as well. Some form of lime is essential for the formation of sound shell. Grit is necessary for the birds' digestion, and the water supply must be clean and regular. The source of lime is important in a very limeless country, such as heavy clays watered by acid soft-water streams from moorlands; oyster-shell grit such as is given to poultry is excellent. On a chalk soil with hard water oyster shell may be too strong and tend to produce an egg which is rather too thick-shelled to chip properly. Here a supply of chalk is all that is necessary. In general nothing can beat a sackful of old coarse mortar, for this contains not only adequate

lime but plenty of small grit and pebbles as well. Where the ground is clay, a supply of finely broken flint, or preferably quartz grit, is a very material factor for insuring health for the birds.

Game farm eggs and aviary eggs should show as a rule at least 90 per cent. hatchability, and often exceed this proportion, but eggs must be collected quickly and not left to be chilled by the sharp ground frosts of March and April, and while stored they must be turned once a day to prevent the yolks settling and sticking to the side of the shell. This is done on a game farm, but sometimes overlooked by a keeper. Occasionally it happens that a cock, though apparently vigorous, is nevertheless sterile. It is therefore a good rule to always have enough birds to exceed your requirements, and to buy a certain proportion of eggs outside.

I believe that a good deal of pheasant mortality and failure arises from neglect of simple common sense about the pens. These are not cleaned or limed and become very seriously fouled ground. They stand there year after year, and just because the adult birds the keeper puts into them do not die they are believed to be satisfactory.

Pheasant diseases will be discussed in detail later, but they are the most important thing to carry in mind all through this business of rearing. We are crowding far more birds into small space than is natural in wild life. As a result we get epidemics (more correctly epizootics), and in normal conditions we put down two eggs for every bird we hope to raise to maturity. This 50 per cent. mortality would be appalling to any other kind of stock, but it is accepted as normal where pheasant rearing is concerned. True, disease and wrong feeding are about equally responsible, but wrong thinking is the real trouble.

The egg itself does not, so far as we know at present, carry in itself the germs of any disease but one. This is bacillary white diarrhœa, the ill-famed " B.W.D." of the poultry farmer. Pheasants suffer from B.W.D., and death from any diarrhœa epidemic in the first two weeks of life should be looked on as probably due to B.W.D. It must for the moment be looked on as unavoidable, though in the fuller discussion on diseases it will be further dealt with.

The adult pheasant can, however, serve as a carrier of other diseases which do not seriously impair the grown bird's health, but are fatal to chicks. Eggs

are laid on soiled ground or soiled by the birds, and a fouled pen may be the starting-point of an infection which only appears on the rearing field later. As a matter of routine each egg collected should be wiped over with a cloth wetted in methylated spirit. This insures that the eggs at least start clean.

The next process is the hatching of the eggs. Incubators can be used, but as a rule are far from satisfactory. They are not used to any extent on the big game farms, although most of these have experimented with them. Under perfect conditions of control they are all right, but neither laboratory conditions nor skilled attention are usually available. Their main use in the game field is to help the keeper in cases of emergency where hens refuse duty or become troublesome.

In general for hatching our eggs we rely upon the homely domestic hen in place of the incubator and foster-mother. I do not think that this old-fashioned mechanism will prevail for ever, but to date there is such a difference between the ordinary oil-lamp poultry incubator and foster-mother and the proper electrically heated laboratory equipment, that so far keepers who are experienced and successful poultry rearers have not found the incubator effective with game. Later, as the electrification of country districts proceeds, we may find the more regular temperature and better atmosphere of the electric incubator suitable for game eggs. It is being successfully used at Cambridge, and electric brooders are giving good results and protection in early days from gapes and external infections.

The selection of hens is dependent on local circumstance. The keeper visits farmers and cottagers and buys old broody hens at a flat rate of three shillings and sixpence apiece. Five good hens can sit a hundred pheasant eggs, but it is better to allow six hens to a hundred eggs and reduce the clutches in proportion. Economy in hens is unwise, but it is sometimes forced on one when several thousand eggs are being put down and broodies are scarce. Fashions in broodies vary in different parts of the country. One man prefers light fowls, another prodigious matrons. In theory the large fowl damages more eggs and chicks. Personal observation rather inclines me to believe that the damage done by a hen is in direct ratio to her fussiness and bears no relation to her size.

Get rid of any unsteady or fussy hens, and incidentally, if a hen who has

sat well proves unsteady and too excitable on the rearing field, do not trust her with the brood, substitute a reserve hen of steadier character.

The design of sitting-boxes is not particularly important. In normal practice many estates knock up their own, or a keeper improvises what is needed out of old boxes, sacking, and netting. A range of six side-by-side boxes can be bought for little over a pound, and is durable and convenient. The disadvantage is that sometimes side-by-side boxes lead to restlessness which can be avoided by separate spaced boxes, but what is more serious is the fact that if the sitting-boxes are not carefully and very thoroughly disinfected at the end of each season they are likely to carry through vermin, and may be seriously infected. The great advantage of the improvised grocer's box, sacking, and wire netting contraption is that it can be burnt at the end of the time. When one reflects that a pheasant's egg costs a shilling, and every bird reared costs on the average ten shillings, there is no economy in stinting equipment, but a great deal to be said in favour of using cheap material to begin with and burning it when done with. Improved methods in pheasant rearing are not so much fighting diseases when you get them, but in trying to avoid introducing them.

The question of moistening pheasant eggs is debatable. Many keepers never spray them, a few splash a little water round the nest, others rather tend to overdo it. In general it depends very much on the weather. In a very dry summer moisture is beneficial. In the average English May there is intermittent rain and a warm, moist atmosphere. If moistening is desirable, a very fine flower spray is the best apparatus to use. Handling the eggs should be reduced to the lowest possible proportions, but outside eggs should be occasionally gently turned to the centre of the nest. About the twelfth day eggs should be tested for infertile or "clear" eggs. They are held against a mask of cardboard with a hole in it smaller than the egg, and any strong light focussed through. Sunlight will serve, but a temporary examination box improvised with a lamp or an electric torch, and a bent wire egg-holder against the screen, is convenient. Fertile eggs are opaque but for the air space; infertile eggs are clear.

Most game farms will replace infertile eggs, but these must be sent back to them unbroken. It seldom happens that a high proportion of clears is found, but it does occasionally happen that an undue percentage occurs. It is difficult to ascribe a reason, but it appears to occur less frequently with eggs from farms

where the small movable pen system is pursued than from those where the big mass pen of a hundred or more birds is used. Here the amatory endeavours of the young cocks are frequently interrupted by older or more pugnacious birds, and in the joy of battle the seductive cause of the quarrel slips away.

The replacement of clears is better done at the time by putting down one or more extra sitting-boxes. The eggs to replace them from the farm will be at least three weeks later than the others, and many keepers find it wiser to cut the loss and not ask for more eggs, which will in any case be late and prolong the rearing field work for another month. This is, I think, the soundest economics, for the earlier birds can be raised the greater the probable avoidance of trouble.

Game farm eggs show a time scale of prices.

In general prices are standardised by the Game Farmers' Association. Eggs can on occasion be bought cheaper, but the potential saving of a pound on a hundred eggs is likely to be a dear economy. The saving only represents two mature birds less in money; it may well represent a hundred mature birds less in fact. In an organised trade if one man's demand exceeds his supply he can probably secure stock from a fellow-associate. The outside man is not so fortunate, and if by any chance he cannot fill his orders his clients may have to wait or may be served with indifferent eggs, such as bought wild eggs of doubtful fertility.

The advantage of earlier eggs is in theory that these are laid by hens of unexhausted vitality served by cocks in all the vigour of their spring rapture. There is something to be said for this, although I fancy eugenists interested in the human are nowadays rather down on the first-born. A far more practical point of view is that the earlier we can grow our birds the better. The keeper knows this is so, but I doubt if most of them know why. I am fairly convinced that there is not a great deal of difference between the viability of early and late eggs. Late eggs usually give results so good that they astonish the hatcher; but here is the snag—it is one thing to hatch eggs, another to rear the chicks. In my opinion the chances of epidemic disease or parasitic infection (which is *qua* pheasants almost the same thing) are doubled.

The hot and moist July-August weather is favourable to the flies and insects, and it is the flies and insects which distribute the majority of the diseases.

The early egg is best because it means greater growth before the summer disease curve approaches its peak. Early eggs, although dearer in first cost, are far cheaper in the end.

Before any broody hen is set on eggs there is a sanitary routine to be carried out. The hen must be freed so far as is possible from all kinds of parasites. The average hen has plenty. They do not make for restfulness, and they are a potent source of infection and weakness with chicks. Hens with scaly leg should be avoided; it is curable with ordinary paraffin oil, but this means disturbance. The ordinary flea is a nuisance, but is moderated by insect powder; mites of different kinds are even more troublesome, and a good dusting with sodium fluoride is advisable before the eggs are set. After that occasional dustings of the nest with powdered naphthalene, obtainable at any oil shop, or the pyrethrum insect powder are advisable. In bad cases a bath of ½ oz. soft-soap and ½ oz. potassium pentasulphide in a gallon of hot water is needed. This process of de-lousing cannot be too thoroughly carried out. The hen is not human, but she is irritable, and de-lousing means both steadier hens and healthier chicks. When sitting the hen not infrequently suffers from that very general complaint of matrons, a costive bowel. When let out for food and water she may in some cases be in a run, but the old system of tethering to a peg has this advantage, that if she does not do what she ought she can be gently picked up once or twice and dropped on the ground. This will make things work.

The evolution of the embryo in the egg is a very remarkable affair, but very few shooting men, and hardly any keepers except the Scotch (who are thorough and very well educated), realise exactly what is happening. A general popular grasp of avian biology is, however, essential if we are to have a clear idea not only of what we are doing but why we are doing it. Mr. Samuel Butler once posed the question of which came first, the hen or the egg? Subscribing for the moment to the school of Tennessee, let us begin with the hen.

A hen starts its adult life with uncountable possibilities in the way of eggs. The reservoir or ovary contains thousands of potential eggs graduated in size from an oöcyte—a tiny cell only visible under the microscope—to mature yolks ready to appear as the normal egg. At intervals these are shed and appear as eggs, but there is no life in them unless they have been impregnated or vitalised

by the male element from the cock bird. An egg is no disproof of a pullet's virginity, but a hatchable egg is a proof of successful matrimony.

The oöcytes or embryos increase in size in the ovary by the laying down of yolk material by the bird. The yolk is not the material which turns directly into the structure of the chick, but is purely a food supply for the developing embryo. It consists of complex fat substances with a high proportion of phosphorus.

The egg yolk is surrounded by a very thin membrane, the vitelline membrane, which separates it from the other yolks on the ovary, and later from the white in the shell. On this membrane a slightly thickened spot can be seen. This is the germinal spot, the place where the chicken starts.

When the hen is impregnated by the cock a number of male germs or spermatozoa find their way up the oviduct. This is a funnel-shaped organ with many convolutions. The matured yolks come off the ovary cluster and pass into this tube. In the top portion they meet the male spermatozoa, and one of these is attracted to and penetrates the germinal spot. This fusion of the male element with the female element produces fertilisation. The egg yolk moves down the oviduct with a slow twisting movement. As it goes through the second part of the oviduct the albumen or white of egg is deposited on it in layers, and the twist given to them forms the ropes or chalazas which tend to anchor the yolk in position in the white. In the third section of the oviduct this albumen flow alters in character and viscosity, and doubles, forming the shell-lining membrane and enclosing fold which will later be the air space. In the last section of the oviduct the shell material of two different layers and the colouring pigment are laid down over this membrane. The whole process is completed in less than twenty-four hours.

The fertile egg when laid has a porous shell and shell-lining membrane, and contains albumen with a high proportion of water. The slow evaporation of this water through the egg-shell leads to the development of the air space at the blunt end of the egg. The size of this is an indication of the age of the egg.

The sex of the egg is, so far as we know at present, already determined from the moment of fertilisation. So far no means have been devised for insuring a preponderance of one or other sex by any method of prenatal feeding. The

odds on male and female are so far as is known equal, and it is purely a toss up which you get. Each male spermatozoon has two sex units or chromosomes, XX, and each egg has two sex units, XY. If the XX of the male combine with the X in the female, the result of the toss is, so to speak, "all heads," and a male results. If they combine with Y in the egg we have "heads and tails," and it is a hen.

No one knows why the spermatozoa puncture the germinal spot. It is almost certainly a chemical attraction, but may be influenced by other conditions of tension. In the future we may find out how to give a selective bias to the attraction, and so be able to influence the ratio of the sexes, if not completely control them.

During the time the impregnated egg is passing down the oviduct and being wrapped up in white and shell, the spot where the chick starts is also developing from a point into a slight thickening or disc called the blastoderm. When the egg is laid development usually stops until incubation is begun. In very hot climates further development may take place for some hours, and eggs should never be stored in a place where the temperature exceeds 50° F.

The period of incubation needed for a pheasant egg is rather more than that of the domestic fowl, and varies from twenty-two to twenty-five days, twenty-three being about average in a good summer. The development of the embryo in the shell under the sitting hen is very rapid, and its first important process is to perfect its arrangements for breathing and getting rid of waste products. It is as well to realise this very clearly. *The embryo breathes inside the egg.*

On the first day the blastoderm disc splits into layers and folds, and these shortly unite to form a small closed bag or cradle known as the amnion, which protects the developing embryo. On the second day a fine membrane full of bloodvessels starts from this and gradually works round next to the shell membrane, slowly enclosing the whole content of the egg. This is the allantois, or breathing apparatus, and it absorbs oxygen from the atmosphere, passing through the pores of the egg-shell and membrane and into the air sac of the egg.

By the fourth day development is well advanced and the white is largely absorbed into the yolk, through which it passes as development material to the embryo by absorption through the external network of bloodvessels. At the end of twelve days the embryo has changed to a recognisable chicken, with

the *egg-tooth* on the end of its beak. This is the specially provided egg opening apparatus with which the chick completes its journey to the outside world.

About the fourteenth day the chick moves round in the shell so that the head is at the wide end of the egg. Two days before hatching the chick pecks through the shell membrane into the air space of the shell and begins to breathe in the proper sense through the lungs instead of simply absorbing oxygen through the vessels of the allantois.

More oxygen means more energy, and the chick proceeds to chip the shell with the egg-tooth on its beak, eventually breaking out into the world and leaving behind it the allantois attached to the shell.

The yolk sac is almost entirely absorbed before the chick leaves the shell, but there is still a residuum which is its starting ration for outside life. It requires no food for twenty-four to thirty hours after hatching. The yolk sac does not connect direct with the bowel, but is absorbed by the bloodvessels surrounding it.

If we consider the various processes which have taken place in the incubating egg we see the need for care during the brooding period. In many cases we find an undue loss from chicks " dead in shell." These have usually reached an advanced stage of development and die about two days before hatching. There will also be some " addled " eggs in which fertilisation has taken place but the egg has " gone wrong " before development has proceeded very far.

The points we have to consider are, first, the maintenance of temperature. This in the broody hen is about 105° F. In bad weather it tends to decrease, and eggs on the edge of the clutch may not be fully warmed. This is controlled by covering sitting-boxes and feeding the hens well with maize, which is a generously heating food.

Next we must consider moisture. This is necessary in order to prevent undue evaporation of the egg moisture and thickening or toughening of the shell membrane. In the ordinary way a hen wets her feathers in dew and this is enough. In dry weather, or as a routine, a spray may be used. The eggs must also be turned lest the embryo touches the shell membrane and adheres to it. Usually the hen does this, but it is as well to turn the eggs at least once a day while feeding the hen. Lastly, there is the breathing process: dirt, greasy hands, excess moisture, or too stuffy conditions all tend to limit the available

oxygen supply. The period of cooling the eggs once a day allows fresh air to be drawn in through the pores.

Dead in shell is often attributed to a "weak germ" on the part of the cock. This is a possible factor, but the hen may be as much to blame for deficiency in the egg. In general I am inclined to believe that losses from this source can be materially reduced if great care is paid to feeding in the pens before laying and the greatest possible care is taken to collect eggs before they are chilled by frost, to store them carefully at a temperature of 50° F., and turn them regularly every day.

The egg demands from the hen calcium phosphorus and fats. It also requires certain vitamin factors A and D. The former is the growth-promoting element, and the latter, found in association with it, appears to be connected not only with growth but reproduction. Both are found in cod-liver oil. Lime and phosphorus are found in a readily assimilable form in bone meal. The adult bird can take cod-liver oil and bone meal with the ordinary food, but where this is used for chicks it needs to be balanced by excess of vitamin B, which is found in wheat germ and vegetables. The addition of a small amount of dried yeast or marmite or detoxicated wheat germ will furnish a complete vitamin balance, and is advisable with adults and absolutely essential with chicks.

When the hatching of a clutch is part accomplished one or two eggs may be delayed. Rather than retard the whole brood these may well be put in an incubator or under another hen to finish and the existing brood moved with the mother hen to the rearing field.

Few things are as important as the selection of the rearing field site. It should be sunny, well drained and provided with a not too distant pure water supply, and with a good growth of new hay or clover able to give cover as well as food to the chicks. The best provision is to mow alternate strips short, leaving others long. This system allows the birds to use short quick-drying grass after showers in place of getting drenched in the long grass.

It is of vital importance that the rearing field should not have been used for rearing game, poultry, or turkeys for at least three years previously. If it has been, the ground is almost certain to be still contaminated with disease. A clean field which has been heavily limed during the previous autumn is the primary requisite.

Coops cost seven shillings apiece and do not require runs, but a few runs should be provided for isolation wards for any brood which seems to be ailing.

Few matters are as important as the feeding of the chicks on the rearing field, but so far the feeding of game birds has not been scientifically worked out to the extent which poultry food has reached. Even the latter still presents many unsolved problems, for practically speaking very little is known about the nutritional requirements of birds and the variation of vitamin balance and albuminoid ratio necessary for the best and most economical feeding of the different species.

The requirements of poultry chicks and pheasant chicks are widely different, and the requirements of the latter approximate more closely to those of the turkey and guinea-fowl than poultry. So far as can be deduced from field experiment and normal practice the pheasant chick requires more animal food and less carbohydrate than the fowl, but at the same time it requires far more available vitamin B to balance the excess of A and D in the animal element. In normal summer weather adequate sunlight forms vitamin B in young growing things. In sunless wet years we get B shortage showing itself as "cramp" and associated deficiency diseases. Our feed, if it consists of meat and manufactured meals or cooked biscuit meal is largely robbed of its vitamin B content, and we actually produce the condition of disease and weakness we wish to avoid.

The vitamin B balance can be restored by adding yeast, dried yeast, sprouted seeds, or detoxicated wheat germ such as Bemax, Equimax, etc., or in emergency marmite, to the food. Excess of B is apparently harmless; excess of A and D is a prompt cause of disease. *Assimilation of the A and D vitamins and the necessary calcium phosphorous ratio for proper growth appears to be dependent on the presence of adequate vitamin B.*

There are two schools of pheasant feeding, the "dry" school and the "wet." Both have their partisans and their antagonists. Some firms supply foods designed to meet the needs of either system, and so far as general opinion is concerned the "wet" system is most used, as it is believed that it gives the best results in average hands. In the "wet" system the greater part of the food is various meals, meat, and egg, "cooked" or scalded, and sufficient moisture is added to make the mash granular and plastic. In any case it should never be so wet as to be adhesive. In the "dry" system reliance is placed on crushed

cereals with certain additions in the shape of dried egg and dried insects, and in certain proprietary brands an oil or a blend of oils is added to the chick grade.

The "wet" system is open to question when one considers that in many cases the meals used are lacking in adequate vitamin content, and often short of calcium and phosphorus. The "dry" system is also open to question, as it requires far more attention to watering the coops, and it does not conveniently allow the ready adjustment of any lacking factor. Neither system has proved infallible, and there is room for far closer study of the dietary needs of the growing pheasant chick.

For the first twelve to twenty-four hours the chick is self-supporting, as it is absorbing the remains of the yolk into the body, but not, as is commonly believed, into the gut. Then for the next fortnight it is fed in the case of "dry" feed on a finely ground compound of small seeds and cereals with which is incorporated a proportion of dried egg, and in some cases a certain amount of dried meat or dried insects (mainly *corixa* and water-beetles), and also oil or a blend of oils. If we look over the seed in a really good "dry" feed, we find corn, oats, and maize as a predominant factor; hemp, linseed, millet, dari and canary seed in lesser proportion. Further, we find that although in this the larger seed is broken fairly fine, it is nevertheless whole natural grain and has not been deprived of its germ or its vitamin and mineral containing outer layers. As these are the indispensable source of vitamin B, there is good reason to commend the mixture. In the "dry" feed the source of the vitamin A and D is presumably the dried yolk of egg, and to a lesser degree the millet and linseed. The oil, if a vegetable oil, is probably not an important vitamin A source, as the particular vitamin A is only concentrated in fish and animal oils, but is useful as a lubricant and as a fat food. Dried egg is decidedly not as good as fresh egg, but is accepted as a moderate source of both A and B. Dried meat is apparently devoid of any vitamins at all, but is a useful proteid food provided that other ingredients supply the essential balance. A plentiful supply of fresh green food and clean water is also essential when the "dry" food system is used.

On the "wet" food system, the food for the first three days or so is hard-boiled egg chopped and rubbed, white and yolk together, through a sieve. One

egg to twenty chicks is a popular basis of calculation. To this is gradually added meal or "biscuit meal," frequently a proprietary mixture. Where a pure meal is used Sussex ground oats or barley meal is probably the most satisfactory, and it is important that it should be "grist meal"—that is to say, the whole grain, husk and germ, mealed together without separation as in flour. Two parts of barley meal, one of maize meal (which should be yellow), and one of oats make a very successful meal. "Biscuit meal" does not carry the vitamin complement of the true meals, and should be used as little as possible. In some proprietary biscuit meals cod-liver oil and other matters are added to replace the abstracted vitamin A values, but the absence of B is no less important, and its reintroduction to a meal in correct proportion is a matter of some difficulty.

In addition to the egg and meal, greaves (dried meat) or boiled rabbit are given by most keepers. All the rabbit is used and the broth of the boiling used to make up the mash.

Groats are used by some keepers and should be avoided. Rice is another source of error. The keepers like highly polished rice: it is useful in the human menu too. Both groats and polished rice are vitaminless and contributory causes of deficiency diseases, for in each the grain has been robbed of its germ and outside layers and is, like the biscuit meal, a potential source of upset balance.

As the birds grow older the egg ration is reduced, and as a rule more animal food is given. If the birds are healthy, a proportion of bone meal added to the food is probably a better investment than excess of dried meat (greaves in general should be looked on with suspicion, but a good fish meal or meat poultry meal is useful in moderation), but if they are sick from cramp they do not appear to be able to assimilate it. I believe the cause to be lack of vitamin balance, and a compensator should be used. The practice of scattering a little boiled hemp, or even preferably raw millet seed, is carried out by many good keepers, and is sound in theory as well as practice. Yeast is, however, preferable. Sprouted grain or hemp is also excellent.

Green food is excellent as a condition maintainer, but curiously enough its essential vitamin—vitamin C—is not apparently necessary to birds; its B content is, however, important. In general birds get enough young greenstuff when picking on the rearing field, and at the same time get insect food. I doubt the

value of dried insects, but fresh insect food is undoubtedly beneficial as a food. Whether in the long run it is more dangerous as part of the cycle of some of the internal parasites remains to be seen. In a late insect year it may be wise to feed more *fresh* meat in the shape of butcher's offal—but in this, as in all other matters of pheasant rearing, scrupulous cleanliness is essential. Excess of meat, fresh or dried—or dirty meat—both provoke diarrhœa. If this is noted reduce the meat allowance.

Water no less than food should be available, and always fresh and clean. In a wet season the birds get their drink more off the rain and dew on the grass than from their drinking vessels. In hot dry weather adequate drinking water supplies must be provided, and fouling of the water by excrement must be guarded against. Some keepers add more moisture to the mash, but this increases the risk of food not being taken and left about to ferment and corrupt.

As the birds grow, the wet food is reduced to morning mash only, and the other meals are seed and grain mixtures. Eventually when out in covert mash ceases and grain mixture alone is supplied. It is significant that the greatest period of mortality is usually during the meal period.

The critical periods are usually during the first few weeks and at feathering, but in bad years birds often remain small and stunted. In this case use barley meal worked up with water and proportion of half a teaspoonful of cod-liver oil per bird, and add dried yeast or some concentrated source of vitamin B to allow the A and D to be assimilated. Now let us take a letter from an estate owner whose birds were heavy sufferers from cramp. It is typical of many. In answer to my inquiry what the birds were fed on, he states:

"The feed given in the rearing field is mainly biscuit meal, with a double handful of barley meal to each half-bucket. At eight weeks a little boiled wheat is added. Feed three times a day; not much water. My impression is that we give too much soft food and also not enough greenstuff. We give very little of this."

In point of fact, the biscuit meal he gave his birds also contained dried meat, but in the absence of natural sources of vitamin B—sunlight and greenstuff—the food became unbalanced and acted as a poison.

When we consider a food for any animal we must look at it from two separate points of view—that of a young growing animal or that of a grown animal

which we desire to fatten. In the first case the material must supply the elements for the increase in size. In the adult it has merely to meet reasonable wear and tear—that is to say, repair waste and supply energy. Excess is available for increase of weight in stock or egg production in the case of poultry.

There have been most praiseworthy analyses of the chemical proportions of various foodstuffs, but as we now know, the laboratory is not infallible. Only a few years ago the biologists knew nothing of vitamins, therefore many compounds seemingly soundly constructed lacked some essential elusive matter which made all the difference. Even today the estimation of vitamins and the isolation of vitamins is a problem. They are elusive factors easily destroyed, easily lost, and though they may be produced synthetically—and a fractional amount of ergosterol irradiated in a quartz vessel with light waves from a quartz mercury lamp at a precise wave-length of 247 $\mu\mu$ is even now known to hold a sort of vitamin D in quantity—it may be some time before the results are commercially applied in the foodstuff industry, or found to correspond in all respects with the natural vitamin factors in foodstuffs.

In the past it was customary to analyse foods into certain main divisions: (1) Water content. (2) Albuminoids or nitrogenous matter. (3) Fats. (4) Carbohydrates. (5) Fibre. (6) Ash. In addition the "nutrient ratio" was calculated, for it must be remembered that a certain proportion of the nominally useful material is not used in practice, not digested or assimilated. The nutrient ratio represents for practical purposes the useful portion.

The means by which a pheasant converts food into energy and assimilates material for growth is complicated. The pheasant chick is a restless, hot little thing with a vigorous outpouring of energy. Part of the food we give it furnishes energy and heat, part is assimilated for growth, part passes through as waste. Food is pecked up, and the first thing to be done is to convert it into a soluble form suitable for assimilation. If we track out the process we find the food passes to the crop, where it is mixed with a secretion rather like that of saliva in animals. Thence it passes to the proventriculus or true stomach, an oval glandular affair situated above the gizzard. Here the acid gastric juice pours in and converts the insoluble albuminoids in the food into assimilable peptones. The mixture then passes to the gizzard, a strong grinding mill lined with flint or quartz pebbles, and the mass is ground and mixed. From the gizzard

it passes to the duodenum, where it receives bile and pancreas secretions which act on the fats and oils to split them into emulsions and also complete the digestion of any starch or albuminoid which may have escaped digestion by previous processes. These secretions are alkaline and neutralise the acid juices mixed with the food in the stomach. Food then passes as a fluid from the duodenum to the small intestine.

The small intestine is not simply a tube, but is a filter. Through its walls the transmuted food supplies are absorbed into the blood. In addition it is the home of specialised bacteria able to change a variety of matters. The precise action of these bacteria is still largely unknown, and their effect accounts for many nutrition troubles. If they are predominantly acid-generating bacteria of the type which thrive on the carbohydrates, and they are fed on a biscuit-meal diet, we may quite possibly produce a state of the intestine which alters the assimilability of essential ingredients or smothers and destroys the beneficial effect of the vitamins.

A compounded diet which might, according to the best laboratory intelligence, contain everything we believe a chick should need—and all the vitamins—might be defeated by the action of the secretions or the bacteria or their particular secretions. No one knows !

The absorption mechanism of the bowel is interesting. It is perhaps easiest to think of it as a tubular filter through whose walls the extracted and converted juices of the food pass. But it is a double filter system. In some cases food solutions are absorbed directly into the network of small bloodvessels that radiate in the wall of the intestine ; but if we examine a section of bowel we find it lined with small processes rather like the plush on carpet. These are the villi, myriads of minute tentacles and ridges projecting into the tube. These, too, absorb food solution and pass it into the lymphatic system. In the end all the soluble extracts of the food pass into the blood stream at the jugular vein and are distributed throughout the body.

The food of the pheasant chick in the wild state is very different from that of the reared pheasant, and its exact composition is probably not yet known. The nearest we can get to it is from Mr. Collinge's "The Food of Some British Wild Birds," which deals specifically with the food of adult pheasants.

The proportion of insect to vegetable diet is 37·4 insect to 62·6 vegetable. The insect diet reaches a high level in June, when it averages 43·5 per cent. of the total diet, and declines to 30 per cent. in January.

When you consider that the young wild pheasant gets no chopped egg, no greaves, no biscuit meal, and has to scratch hard for a living when there is no cereal grain about, these matters are worth while pondering. We all know that if we want to hand rear partridges there is nothing like ants and ant pupæ: not the dried shells we feed to goldfish, but nice plump oily meadow "ant-eggs"—well, what are insects made of? Mainly chitin outside and nice creamy fats with a high glycogen content inside. But ants are also notoriously formic acid containers. There seems to be ground for inquiry whether insects act simply as animal food, or whether formic acid has not some direct physiological or, more probably, bacteria killing effect on the intestinal tract.

We ought to know more about insects and, above all, more about the natural food of the wild pheasant chick. It is the natural basis on which we ought to build our carefully constructed scientific artificial diet. The practical disadvantage of a properly balanced pheasant diet is that it will probably be contrary to the established ideas of keepers, and that it will be a long time before they accept the change.

The obviously proper way to approach the problem is to reject all patent and proprietary mixtures containing, or supposed to contain, mysterious and beneficent ingredients. The great thing is to know exactly what you are giving your birds, and a fancy mixture of secret composition may not, for all we know, be at all the right food for them, whatever its makers may believe about it. After all, we have all used these various mixtures—and the results have not been so wonderful. I do not suggest that the makers are not doing their best, but commercial considerations and rearing field results appear to be very widely different. Where claims are advanced for successful work, make a point of visiting in person the firm's experimental department and game farms, and go into their facts and formulæ. You are paying good money for your eggs and labour, and you have a right to know exactly what is in the So-and-So's Super-excellent Pheasant Meal just as much as if you were buying a fertiliser. If they will not tell you, assume the worst, and buy plain sound stuff of known origin

from your local corn-chandler and have your keepers mix it themselves. It will probably be cheaper and wiser, for if you do not know what you are giving your birds, how on earth can you amend the diet to meet troubles caused by unsatisfactory feeding?

Lastly, we have to remember that when we talk over this food with our keeper, we shall be faced with the fact that he buys some kinds by weight in "sacks," others by measure in "bushels," and adds a "big handful" of this, and "half a sieveful" of that. Some foods may be steeped overnight in water, others mixed dry, and we shall find a perfectly glorious confusion of weights and measures when we try to reduce his rearing field diet mechanism to some kind of proportion. Nevertheless this is what we have to do—reduce keepers' measures to some approach to order, then estimate the probable balance of the food constituents we are giving our birds.

Thanks to the work done by Professor T. B. Wood and his colleagues at the Cambridge School of Agriculture we know a great deal about farm animals, and we can work out from tables a soundly balanced ration containing the special elements necessary for their well-being. We can further adjust this ration for specific purposes such as fattening or breeding. The basis of this work lies in the very careful series of experiments which have been made to find out what the normal minimum consumption of the animal itself is. So far as stock are concerned, figures can be given showing the actual body requirements—that is to say, the necessary fuel required every day to keep the body engines going. Once that is known a correct ration to allow for normal requirements can be calculated and stock can be scientifically but economically fed.

In the case of poultry and small animals these data have not yet been worked out. We do not know what losses are involved in digestion, what demands are made by the process of growth, or any of the facts which will help us to work out precise diets for our birds.

Generally speaking all cereals are low in calcium content, and when we get these deficiency diseases we may be feeding a diet too high in phosphorus and too low in calcium. Excess in phosphorus would lead to the bird using up some of its own calcium in the endeavour to neutralise it. Calcium phosphate has been put forward by some authorities as a suitable chemical to replace both

calcium and phosphorus, but this appears to be in many cases open to doubt. The ratio of assimilation of calcium and phosphorus in birds probably varies with age and growth, and needs to be worked out not only for poultry but for pheasants and other economically useful birds. There are some indications which suggest that the proper assimilation of both calcium and phosphorus is largely dependent on sound digestion, and that this is in birds very much bound up with vitamin balance, predominantly that of vitamin B.

During the last two years experiments have been carried out at Cambridge University at the Institute of Animal Nutrition by Mr. E. T. Halnan, M.A., with pheasant chicks. So far the proper ratio has not been determined, but the experiments have had useful results, and will in the future lead to the establishment of a scientific basis for pheasant rearing.

In the present state of knowledge it is interesting to compare some standard methods, beginning with the technique of twenty years ago, and put them down in the way a modern poultry farmer considers his feeding systems for ordinary poultry rearing.

Albuminoid Ratios of Pheasant Foods

If we take the food for rearing pheasants recommended by one authority* we find that he divides it into three stages.

First stage, "custard," made by boiling lightly together equal quantities of egg and milk. This is one dozen eggs to a pint of milk, and it can be taken as a day's ration for thirty-five to forty chicks fed six times a day. This ration is given for the first two days only, and possesses the astonishingly high albuminoid ratio of 1 to 2·03.

The albuminoid ratio of yolk of egg alone is	1 : 4·3
New milk	1 : 4·0
Whole egg, white and yolk	1 : 1·9

Many keepers mix a little fine oatmeal or biscuit meal with the custard. This would have the effect of reducing the ratio, and the addition of a cupful or so of oatmeal would bring it to 1 to 2·75 or 3·0.

* "Practical Game Preserving." W. Carnegie. 1906.

The second stage feed consists of wet mash:

Oatmeal	400	parts
Maize meal	250	„
Ground rice	250	„
Hempseed (broken) { 3 parts } Linseed meal { to 1 part }	50	„
Greaves	50	„

This is given for the first fortnight mixed with the custard, and the only change is that the number of times of feeding are slowly reduced to four, and then to three times per day. The albuminoid ratio of this meal is 1 to 4·9, but as two parts of custard are used to each part of meal the ratio is actually about 1 to 2·5.

The third stage is a grading off on to a coarse mash or grain meal, which is first given wet and later dry. To begin with it is only given midday, then midday and evening, and the custard slowly reduced and at last discontinued. At the age of a month the custard is stopped, but at a fortnight they begin to take the third stage food.

The third stage food consists of:

Coarse oatmeal or Sussex ground oats ...	250	parts.
Kibbled wheat	250	„
Millet	125	„
Maize (kibbled)	125	„
Crushed pease	125	„
Canary seed	62·5	„
Hempseed	31·25	„
Linseed	31·25	„

Of this the albuminoid ratio is about 1 to 4·35, but as custard is used as well it is probable that 1 to 3 represents an average factor.

The average keeper uses today a higher proportion of rabbit than he does egg and milk in the form of custard, and it is not very easy to draw out figures for this. If we take this last third stage food and replace custard with two rabbits to the bushel, the albuminoid ratio works out at 1 to 3·75.

The foregoing examples represent the pre-war school of very lavish feeding

with a high proportion of egg. Today the keeper uses, from motives of economy, a higher proportion of rabbits or dried meat, "greaves," "meat meal," etc., to replace the eggs. Where one egg to six chicks was a formula of the old régime, one egg to every twenty for the first week, reduced to one egg per thirty for the remaining time, is accepted as a modern proportion. Egg feeding on the old scale would account for 5,000 eggs for 1,000 chicks in thirty days. The modern scale should not exceed 1,300 eggs in thirty days. The difference between £20 and £6 (taking eggs at about 1d. each) is worth appreciating, but the use of doubtful greaves and vitaminless meat meal may introduce sources of error just as costly. If we take a pheasant as worth 10s., and we save an extra hundred birds out of our 3,000 chicks, we are money in pocket!

If we take an average of modern proprietary mixtures we get a mixture approximating to the following:

Corn	500 parts.
Maize (kibbled)	160 „
Millet	160 „
Biscuit meal bits	100 „
Buckwheat	65 „
Hempseed	10 „
Linseed	5 „
	1,000 „

This has an albuminoid ratio of 1 to 6·5, and mixtures of this nature are used from one month onward.

The extent to which reliance can be placed on the albuminoid ratio without reference to accessory food factors is extremely doubtful. At Cambridge an experimental laboratory diet of equal parts broken wheat and maize (A.R. 1 to 8) proved fatal, as did one of Spratt's white game meal, seven parts to one part of meat meal (A.R. 3·35). To these birds when ill radiomalt was given, but only effected a temporary recovery. Whether the use of yeast in place of a synthetic vitamin concentrate would have saved the situation cannot be told.

The breakdown of the higher ratio of experimental food may probably be ascribed to lack of vitamin balance, for neither activated oil nor irradiation seem to completely take the place of the vitamins B1, B2 present in young green vegetable food or yeast.

Yeast further represents an element of glycogen and special ferments whose influence on general metabolism in young birds is important but not recognised. It is in some respects not unlike insect food. The average run of chicken and game meals are, so far as their albuminoid ratio is concerned, balanced around 1:4, which is quite the best for chickens, but markedly inefficient for pheasants. The best samples of game meal with some small proportion of fish oil, dried milk, and dried egg, range about 1:3·5, and when mixed with other food decline rapidly toward 1:5 or 1:6. Most contain dried meat meal of extremely doubtful value. It serves to balance a column of figures, but its real value in this state can be looked on with that modification of belief which awaits scientific proof. I would not call all dried meat doubtful, but I like to be convinced of the real value and goodness of any particular sample. It is not all simply the useless and exhausted residue of glue and other by-product factories, but most of it is very nearly as bad. Meat meal and greaves want careful selection, and in my opinion the nutritive value of any game or poultry food ought to be definitely ascertained and legally enforced, just as the law insists on a clear bill of contents with fertilisers.

Fresh locally ground meal with all its germ, fresh meat, fresh eggs, are the main essentials of successful feeding. A small admixture of cod-liver oil and dried yeast in combination with essential mineral salts to supply calcium and phosphorus can be used to compensate for the shortcomings of any dietary, and work out far cheaper than many established systems.

Last year (1928) I successfully raised pheasants on a straightforward poultry diet to which was added a very small proportion of a compound compensator designed to provide a correct vitamin balance.

This year (1929) experiments are being carried out at Cambridge with a primary diet of chopped egg and "pin" oatmeal, and the birds will afterwards be fed on a dry mash.

A successful pheasant chick dietary capable of very wide control is the following:

First two days, hard-boiled eggs passed through a sieve. This is gradually thickened by the addition of a little finely ground oatmeal. Egg may be continued in gradually diminishing ratio for a fortnight, but is not essential.

It can be replaced with the following formula used in the proportion of a tablespoonful to a coop of twenty chicks mixed in with the meal:

1 lb. dried yeast (Messrs. Midgeley of Pudsey supply tins).

½ lb. calcium lactate (Messrs. Griffin, Baird and Tatlock, of Kingsway).

2 oz. dibasic potassium phosphate (Messrs. Griffin, Baird and Tatlock, of Kingsway).

4 oz. liquid cod-liver oil (Messrs. Parke Davis, of Beak Street, supply this with guaranteed vitamin content, and will supply the complete formula ready made up).

The meal used was as follows:

Bran	20 parts.
Thirds	35 „
Sussex ground oats	20 „
Maize meal	15 „
Meat meal	10 „

The meat meal element can be replaced by an equivalent proportion of rabbit or rather less of minced butcher's scraps, or it can be entirely eliminated and replaced by a concentrate of one part of dried yeast to three-quarters of a part of cod-liver oil. The change from granulated meal to broken or whole grain must be gradual, and it is as well to remember that to begin with chicks need very little food, but need it often. In no case must any meal with any meat meal in it be mixed and allowed to sour. Whole grain, boiled or steeped in hot water and covered overnight, is used by some keepers with success. Finely broken hard grain and small seeds, as used in dry feed mixtures, seem to be just as easily assimilated. All meal should be freshly ground, for the germ ground with the meal becomes poisonous if it is not used quickly.

Special care is needed when the tails begin to shoot. Feathering can be assisted by the addition of a little sprouted, scalded hempseed, or by the addition of a little linseed to the ration.

This year (1929) I have raised birds on a purely poultry diet to which the above compensator was added. No rabbit or dried meat was given, and the experiment was wholly satisfactory and enormously reduced costs of rearing.

III

PHEASANTS

Chapter III

PHEASANTS

THE history of the rearing field is not infrequently a campaign against disease. The keeper's diagnosis is at best a rough one, and his "enteric" or "diarrhœa" may be one of many diseases. Expert advice should be sought at the first sign of trouble or a heavy proportion of the flock may be lost.

Bacillary white diarrhœa (B.W.D.), caused by *Bacillus pullorum*, occurs in the first few days of life. The mortality rate is high, but the birds sometimes recover naturally. Whether the pheasant cock, like the poultry cock, is a carrier is not yet known. The disease usually shows in the first week as white diarrhœa with pasting up of the vent. The period of incubation is within some ten days and the infection may last a month.

Immediate isolation of or destruction of affected birds is necessary, and the ground should be changed. No known treatment is given, but last year I checked and cured an outbreak with calcium lactate given in the food.

Fowl typhoid is often confused with B.W.D., but is due to another bacillus, *B. sanguinarium* (*B. gallinarum*). It is an infectious septicæmia, but accompanied by diarrhœa, usually yellowy-green. Post-mortem usually shows no marked duodenal inflammation. Isolation is the only method of dealing with it. Thorough cleansing of the ground and general disinfection are essential.

Fowl cholera, caused by *Bacillus avisepticus*, is also a virulently infective septicæmia and very rapid in its effects. It is usually distinguished by a green colour in the droppings, and the white of the excrement is yellow, as is the kidney of the bird. Weakness is rapid; the bird drowses and is usually dead in three or four days. There is no practical cure, though a serum inoculation is used for fowls on the Continent. All affected birds should be killed and burnt and everything disinfected. The bacillus is, however, not a lasting ground infection, and ground so fouled is clean in four months.

Coccidiosis is probably the most formidable pheasant disease we meet, for

it is the commonest of the "enterics" or "diarrhœas" of the keeper. Unlike the preceding diseases it can be identified without bacteriological examination, but requires a microscope of medium power. It is caused not by a bacterium but by a protozoan parasite, *Eimeria avium*. This is a minute oval body which is a typical parasite of the intestinal tract. Related species are found in the rabbit and pigeon. The disease is rapid, often killing chicks in three or four days. The mortality may exceed 75 per cent., and it will attack birds up to three or four months old. Adults are apparently immune, but undoubtedly act as carriers. The source of infection is difficult to trace, for coccidia are resistant to extremes of cold, though destroyed by desiccation. They may lie in moist earth for two or three years, and be brought up by an earth-worm which is eaten by a chick. They are almost certainly associated with certain common snails and slugs, and are also carried by many mature wild birds. The initial source may be untraceable, but the mechanism of distribution is fairly clear, though neglected by most writers. Chicks seldom pick fæces, and a wholesale simultaneous epidemic must be due to a spreading agent. All indications point to the flies on the rearing field as the agent. Many of these are dung feeders. The birds catch and eat the flies, and by feeding experiments I have been able to prove that coccidia pass unchanged through the sucking tube and crop of flies, and can be recovered in the gut apparently unharmed. Insect life, though a food factor, is in effect a far greater peril when rearing is practised on a crowded scale. The earth-worm is certainly a source, but it is still doubtful if it is a wholesale distributing agent.

Recovery sometimes occurs naturally. The usual remedy advocated is the use of powdered catechu in the proportion of a teaspoonful to a gallon of drinking water. This is dubiously effective, as sick birds will not always drink medicated water, and prefer raindrops or dew. In addition they tend to foul drinking vessels with excrement, and the disease spreads.

The curative action of catechu is, so far as I can judge, entirely due to the free tannin coagulating the poisons or toxins produced by the coccidia. It is this toxin rather than the mechanical injury to the cells which appears to be the true danger.

Catechu given in food would appear preferable, but birds will not eat it in any usual form. If, however, we dissolve catechu in formalin and precipitate it with hydrochloric acid we get a red-brown powder, which is mainly methyl-

ditannin and some complex impurities. This is insoluble in water but soluble in alkalis. It breaks down in the intestine, which is alkaline, and appears extremely effective. It has the advantage of being easily compounded with the mash, and small doses are quite adequate. So far my work with it has been purely experimental, but it provides a new line of attack.

The best treatment I have so far found is to adjust the diet of the birds so as to alter the condition of the intestinal tract from alkalinity to mild acidity. The coccidia like a mildly alkaline environment. Acid appears not only to neutralise the toxins but to encourage rapid encystment and departure of the parasites. Ordinary formic acid in the ratio of half a teaspoonful per bird added to the water of the mash is very fairly effective (and apparently checks blackhead in turkeys to a marked extent), but I prefer calcium lactate, added dry and well mixed. This will induce a marked reduction of oöcysts in the droppings in a very few days.

Identification of coccidiosis is easily done by making a smear of the fæces on a slide and examining it for oöcysts. Type slides can be got from Watsons, and any old microscope with a half-inch or quarter-inch objective will serve. In the case of post-mortem a flotation technique of dropping fæcal content into a sugar solution (1 lb. of sugar to a pint of water) is effective and saves time. Shake and allow to settle for twenty minutes. Touch a cover glass to the surface of the float and examine on the slide.

All dead birds should be burnt and all fouled ground should be vigorously limed. All gear must be re-creosoted, and a daily change of ground is essential until the epidemic is checked. A teaspoonful of tincture of iodine in drinking water has also been recommended, but no medicine given in drinking water is at all certain in action. Birds often will not take it. Iodine does not appear to be as effective as calcium lactate in food, but disinfects drinking water and may increase the resistance of the birds to disease.

In any case, where there is coccidiosis, water vessels must be scalded daily, as chicks soil them and spread the disease. A Primus stove under a pail of water makes a good field scalding apparatus. Fly reduction is best achieved by scrupulous cleanliness on the field.

Cramp is in my opinion not a bacterial disease but purely a deficiency disease. It is analogous to rickets or the osteomalacia at one time common in

zoological collections. It occurs in wet—or rather sunless—weather, or in drought when young vegetation is lacking and is characterised by weakness, collapse, and softening of the leg bones. In my experience it is caused solely by wrong feeding and vitamin shortage. Cut out all rice or biscuit meal from the diet, substituting fine oatmeal, and give at once some concentrated source of vitamin B such as yeast, dried yeast, or marmite. This should be mixed with warm water and used in preparing the mash. The bone softening is due to the bird reabsorbing its own reserves of phosphorus and calcium which it has laid down as bone. Diet for a fortnight on this mixture, obtainable from Parke Davis:

1 lb. dried yeast,	2 oz. potassium phosphate (dibasic),
½ lb. calcium lactate,	8 liquid oz. cod-liver oil,

incorporated with barley or oatmeal in the mash, and calculated on a basis of a tablespoonful of mixture per coop of chicks per day.

Diphtheritic roup is an avian form of diphtheria with variable symptoms, and is due to a filter-passing virus. The infection is variable in its severity, and affects young birds more severely than old. It usually appears as a discharge from the nostrils or acute inflammation of the eye. It is called variously "fowl-pox," "cold," "diphtheria," "one-eye cold," and is often acute. It is cured by injecting a serum usually obtainable from the regional poultry authority of the Ministry of Agriculture, or serum can in emergency be drawn from an infected but recovered bird. The infection usually comes from the hens, and their immunisation by inoculation may in future become common practice.

In mild cases birds often recover, but it is better to kill at once if the infection is not widespread and limited to a few. Treatment of a flock is difficult, as the disease is often long continuing. Commercial aspirin (acid aceto-salicylic) or sodium salicylate in five-grain doses per bird may be used in the food, but only acts as a palliative rather than a cure.

Tuberculosis.—The pheasant suffers on occasion from tuberculosis, and it should be borne in mind that this is a contagious disease which can infect others. It is a slow disease characterised by wasting, and as in the pheasant it mainly centres in the liver and spleen, it often produces diarrhœa in the later stages and may be mistaken for heavy worm infestation.

It can only be diagnosed by post-mortem inspection, when the liver will be found to be spotted with grey, white, or yellow patches the size of peppercorns, and its substance changed from healthy tissue to cheesy and gelatinous masses. It is frequently called "liver disease" by keepers, as the superficial appearance of the liver is somewhat similar to that noticeable in a rabbit which has died of rabbit coccidiosis. The diseases are, however, quite different.

In advanced cases the true tubercles or small growths can be found on the intestine or other organs, but seldom appear on the lungs. Avian tuberculosis can be caught by other birds such as poultry, and is probably caught from eating food fouled by the droppings of tuberculous birds.

Nothing can be done about it except to take steps to eliminate any bird suspected of infection. Burn all bodies, for the disease, though not communicable to man, is infectious to birds. Lime and quarantine the ground for six months.

Gapes.—The life-history of *Syngamus trachealis* has been worked out by Ortlepp, Waite, and other investigators in our time, and much work has been done in past generations, notably by Walker and Mégnin.

It appears to be satisfactorily established that infection takes place—

(*a*) Through earth-worms and insects.

(*b*) By direct consumption of newly hatched larvæ.

Stress must be laid on the words *newly hatched* because hatching does not take place in the bird, but eight or nine days after they have been passed out with the droppings. The eggs themselves are not infective, but become infective when incubated in the air for this time. The time of incubation is very largely dependent on temperature, which must exceed 68° F., the minimum, and is best at 77° F. Excess temperature to 85° F. does not stop but accelerates the incubation, provided that the essential environmental factors of oxygen and moisture are present.

Walker gave from seventeen days to three weeks for embryos to reach infective maturity at temperatures from 65° to 70° F. Mégnin gave thirty days at 77° F., and Ortlepp finds a proportion hatch at ten days at 77° F. under optimum conditions of laboratory environment.

The cycle of development is as follows:

First day, eggs are passed out of body of host bird in morula stage.

Second day, embryo begins to form.

Third day, embryo coils. (*First stage* of development.)

Fourth day, cuticle begins to form.

Fifth day, development.

Sixth day, development.

Seventh day, cuticle begins to moult and separate from the embryo and the egg-shell.

Eighth day, a process which continues until on the—

Ninth day, the larva pushes off the cap at one end of the shell and emerges in its cuticle, or sheath. This it soon loses, and it is then ready to infect a bird which eats it. This is the *second stage*, and the animal is now a minute worm about 0·28 mm. long, and for a day or two is extremely active.

In this hatched and infective condition the larvæ are easily killed by drying up, and do not revive. They can, however, live without anything, but in a moist atmosphere, for fourteen or more days.

If in this second stage they are swallowed by a chick they pass within twenty-four hours from the œsophagus to the lungs. The route is still not determined, but Ortlepp concludes that it is via the blood stream rather than by direct movement through the tissues. Growth takes place rapidly, and on the end of the second day changes take place in the mouth form, and on the third day in the lungs the larvæ enter their *third stage*.

Changes continue and a moult occurs, and on the fourth or fifth day since they were swallowed they reach their *fourth or final stage*, and are almost full-grown. Up to now they have been feeding on blood in the small alveoli of the lung. They now migrate to the larger bronchial tubes, and the sexes, which up to now have been separate, join together. On the seventh day they may appear in the windpipe, but it is seldom that symptoms are noticed in an infected bird before the ninth day.

Complete maturity is reached in some seventeen to twenty days from the date of consumption, and the infected bird will then begin to pass the eggs with its droppings.

The more we consider this cycle the less faith we can have in any of the anti-gapes remedies. They are at best only palliatives. The general consensus of opinion is that the earth-worms are the main source of infection, and that direct infection from bird to bird is not nearly such a potent factor.

The traditional insistence on a dry, sunny, well-drained rearing field is again justified, and in order to discourage worms sulphate of ammonia can be recommended as a fertiliser. Why it discourages them is not clear; it does not poison them, but it drives them away. Dusting the hens with a powder of prepared chalk and camphor is often advocated. Treatment of the drinking water with 1 oz. of soda salicylate to the gallon helps to delay the spread of infection by affecting the worm in the embryo stage. Most practical methods affected by keepers are fumigating the birds with tobacco smoke or sulphur, or camphor and eucalyptus compounds. These make the birds cough up the obstructing worms from the trachea, but unless great care is used many may die under treatment.

The dislodging of the worms with a feather dipped in paraffin, turpentine, or preferably dilute friars' balsam passed into the trachea, is also practised with success by a skilled hand. The squirting of a 10 per cent. solution of sodium salicylate from a fine-pointed syringe down the windpipe is probably as effective a measure as most.

As infection with gapes proceeds from wild birds, in particular rooks and starlings, who act as carriers all the year round, defensive measures are difficult, and to date research has not found a sound line of attack either to cure or to restrict the affection. All affected birds should be isolated, treated, and kept on salicylate water to prevent further spread. If the infection is general, nothing but hand treatment can be carried out, or general and repeated fumigation may be tried.

In addition to the spread of infection by earth-worms and natural dissemination, drinking vessels should be inspected. These should be cleaned and scalded or treated with a mild disinfectant every day. Pheasant chicks will foul water, and even if one changes ground and limes fouled coop sites regularly, water tins are often overlooked. For gapes, as in coccidiosis, flies and dirty conditions are the mainstays of the epidemic. Iodine tincture has been tried in water for gapes, but it is doubtful if any medicine has a direct effect on a parasite in the windpipe. The effect, if any, is that of a water disinfectant attacking the larvæ before they are infective, or possibly it has a general tonic effect on the birds.

IV
PHEASANTS

Chapter IV

PHEASANTS

IF we are very lucky with our birds, we raise in a good year possibly 65 per cent. of the eggs we have laid down. On the average a lower percentage is probable, and one bird set out to covert to every two eggs laid down represents average performance. This margin of 50 per cent. of failures is far too heavy and adds a good deal to the overhead costs of rearing. Each bird can be taken to consume two shillings to half a crown's worth of food from the time of hatching to the beginning of the season. Feeding in covert during the season costs a little more, and if we work out a fair balance-sheet and charge the birds with overheads in the shape of rent, wages, and depreciation, we find that on a thousand birds a rough figure of three shillings apiece must be added. In some cases a good deal more, according to the staff and conditions, must be allowed. Then we have beaters' wages and the actual outgoings of shooting days. A round figure of two shillings per bird per thousand seems to meet this.

If we raise less than a thousand birds we are not likely to make any particular reduction in these essential overheads, and the actual outgoings for shooting six hundred birds are very little less than those for shooting a thousand. In effect one finds that the one thousand bird unit—based on a calculation of two shillings and sixpence for feed, three shillings for overheads, and two shillings for actual shooting days' expenses—comes out at seven shillings and sixpence per bird. This is about right.

The sale value of game varies, but early season birds command a relatively higher price than those shot in late November and December when the market is glutted. A general figure of four shillings and sixpence represents a good average. The difference between your figure for game sold and the cost of shooting is seldom less than three shillings a bird. In many cases it is a great deal more, as shoots are very often badly managed. The small shoot with five

hundred birds often costs far too much in overheads, and may show a deficit of three hundred pounds; where on a well-managed shoot of four thousand birds the deficit would be little in excess of six hundred.

No general figure can be given, and the above approximations do not include essential margins against disaster or poor marksmanship. In general a minimum figure of £200 per gun per season appears to be about right for a four thousand bird shoot. A higher proportion of staff, convenience of access, or particularly good natural "high" bird conditions, naturally enhance the value of the shoot and raise this figure very considerably.

The keeper sets out his birds from the rearing field to the covert in batches according to their growth. There the poults are still hand fed with covert mixtures or broken grain, and later, as soon as possible, promoted to whole grain. Feeding in covert is essential, but the sooner whole small maize can be substituted for the more expensive corn or broken grain the better, for there is a substantial loss of feed from small wild birds and pigeons.

A point too often overlooked by keepers who change their rearing fields annually is failure to change the feeding points in the coverts. These are usually selected for convenience in access, and, because "birds have always been fed there," the topography becomes fixed. Birds are set out to covert when they are between six and eight weeks old according to growth. There is always a loss from "gapes" when the young poults are turned out, and this permanence of feeding places is probably a substantial contributory factor. The ground is fouled, and flies feed on the excrement, and where barley rakings or the equivalent are scattered, the spread of infection from wild birds is invited. Gapes usually disappears with cold weather and the first autumn frosts, which destroy the infectivity of the larvæ and also cause a falling off in the quantity of flies. Then, but not till then, scratching places and barley rakings can be put down without the risk of spreading infection.

In practice, the losses between birds set out to covert and birds brought over the guns are impossible to calculate. There are always a certain number of wild birds in the woods, and these may in a good year mean that we get 15 per cent. more birds in the bag than we put out. Usually they do not do much more than make good the interim losses. Very often wild pheasants do well in a year which is bad for reared ones; occasionally the reverse occurs.

Often one hears complaints that pheasants have strayed to neighbouring coverts. This is a natural characteristic of the bird, but on a shoot of adequate size straying is usually due to a natural cause, and the cure for straying is to find out the reason.

Pheasants like a sunny slope of "short stuff" near a stream. If there is little water the covert should be improved with shallow six-foot depressions, or ponds of puddled clay lightly topped with cement. These will hold rain water or dew and are a great attraction.

The next factor is grit. This is usually overlooked, but it is a very important thing. The birds need grit in order to furnish their gizzards with proper grinding apparatus. On heavy clays or soils where quartz or flint grit is naturally lacking the birds are hard put to it to find the essential millstones necessary to their health. Birds in confinement, such as game farm birds, rarely show on dissection more than two and a half grammes of grit, while the natural wild bird from a favourable locality averages slightly over four grammes. Very often the amount exceeds this, and the kernels of hips and haws and other hard seed elements undoubtedly act in part as substitutes. A sackful of good fine grit, either quartz or flint, is an undoubted help to keeping birds in covert, and is second only in importance to food and water.

The last factor in natural straying is the presence of too many old wild cocks in the woods. These are pugnacious and well armed, and if you see a peaceful, mild-natured young Mongolian out where he ought not to be, it is not so much an inherent vicious tendency to straying as the desire for the contemplative life. He has probably been boosted out by some imperialistic and experienced old English bird.

The geography of every shoot varies, and in the nature of things we cannot deal with anything but generalities when discussing the lay-out of shoots. There are, however, certain main points to be borne in mind. You must try to imagine the place from the point of view of the pheasant, remembering that the bird mind lives in the present, but learns from past experience.

We will assume that food, drink, and grit are present. It is true that dining occupies most of the bird's day, but we still have to think of bedrooms and the bath. A good dusting place is extremely popular as a bath, and nothing beats the ashes of a wood fire. A dust bath is a bird's way of delousing, and it

contributes materially to their comfort and well-being. The bedroom is, however, far more important. The pheasant, as every poacher knows, is a roosting bird. Many people seem to forget it. Times without number someone has said to me: "This wood never seems to hold any birds. I can't make out why, but they never seem to favour it." There may be other reasons, but the usual one is that the trees are not good roosting trees. They are too big, too tall, too open to the wind, or there is something about them that the birds do not like.

The pheasant does not roost very high, and on the approach of gales I think he roosts lower. His favourite perch is not high up in a tree, but on a small claw-grippable side-branch perch about ten to fifteen feet up. This is beyond the leap of Brer Fox and out of the way of cats, and a perched pheasant has a pleasant sense of superiority. I have seen them bayed by excited (and ill-behaved) spaniels, and they will bend down and "kok-kok" derisively at the dog without the slightest intention of shifting their ground.

If we watch pheasants going to bed, we find it is something of a ritual. They make a good deal of fuss, crowing and calling, and they seem to like to fly up to an easy landing, and do not move very much when once installed in the chair. A tree with comfortable horizontal branches is the essential, but it must not be too thick. Some wind cover and protection appears to be popular, but I am inclined to think that the pheasant also has a keen eye to a situation which also affords a good look-out in most directions. Oaks of moderate growth, silver fir, spruce and old-growth coppice, hazel and ash, appear equally popular. A deodar is almost a certainty if it is not too old and bare below.

There is a certain advantage in the conifers. They grow relatively quickly, and they are a good protection against weather and poachers. Where the deciduous trees shed and leave your birds silhouetted against a tracery of tree-tops and winter dusk, you can hardly see roosting pheasants in the blackness of pines or firs. Where a wood is short of roosting trees, it is well worth while planting them specially for the purpose. Do not consider it from the forestry point of view, but simply make a few clearings inside the wood and plant a few of the largest saplings you can conveniently handle. If you put in small stuff the rabbits will infallibly eat most of them, because the rabbit eats anything new to him in his area, just as the family cat always sits on a new parcel in the house. Corsican fir is reputed to be rabbit-proof, but it must be Corsican,

and most of the so-called Corsican from nurseries is of other origin and not rabbit-proof. I do not think that artificial perches have been tried by anyone Last year I arranged four admirable perches to the quarters of the compass round a young oak, and set them in solidly to the tree. They were to my mind just what a pheasant would like, but to the best of my belief no bird, with the exception of a pair of tits vociferous with domestic squabbles, ever rested on them for a moment.

There is another factor in making the wood or covert a desirable residential quarter for the birds, and that is quietness and freedom from vermin. Disturbance of an irregular nature is undoubtedly bad for the birds, but on the other hand, a wood disturbed by forestry operations does not necessarily show a bad return. I do not profess to explain this, but for some obscure reason the hen pheasant will lay and sit in the middle of felling operations, and apparently not only enjoys human society and all the racket, but actually seeks it. Possibly the felling and barking and the piles of top-wood produce a greater yield of insects and food at a time of year when they are hard to get, and this is thought worth while. Possibly it is the social side which attracts them, but apart from the theft of eggs and predatory activities of the woodmen the effect is not half as bad as might be anticipated. In the case of woodmen a shilling a nest for those reported and saved is custom. More can be paid with advantage. The cleaners-up who come after the woodmen for branch and top-wood need most careful watching.

Vermin are an ever-present trouble, and a good Tyburn tree or vermin gibbet is one of the best signs of a good keeper. The more rodents and stoats the better. Jays, little owls and rooks, all these are enemies. The sparrow-hawk and (during the early rearing season only) the kestrel—if he takes to game—are also enemies. The rarer hawks one should suffer; and the residential fox, although he may take occasional toll, does more good than harm, for he is one of the best of rat-traps and lives mainly not on feather but on fur. Too many foxes one should report to the Hunt Secretary for necessary action (he will burn sulphur, and the vixen will shift the cubs to new ground); but a few foxes will not, in spite of all keepers' lore, do a great deal of harm. They may, however, upset a beat badly and spoil his showing of birds—and his temper.

Badgers are on the whole harmless. They may transgress occasionally, but

they are nocturnal beasts, and every pheasant is safely perched aloft before they move. I have known nests safely hatched out on top of a big badger cete, and I know nothing to their discredit. On the other hand, a badger dig is as a rule a fairly cowardly piece of ruffianism, and when local low life offers to transport the cubs "elsewhere," it probably means a degrading bit of baiting in the outhouse behind some poaching pub. The only justifiable reason for putting down excess badgers is in a hunting country where they too vigorously unstop earths. They are clean beasts and do not carry mange, and where anything affecting badgers has to be done the estate owner will be wise to give it his own personal supervision.

Cats on the other hand are, when "gone wild," the most pestilential vermin. They are cunning and difficult to shoot, but old and spicy red-herring in a trap—cats have little sense of smell and it must be orchestral—is effective. They should be decently buried rather than exposed on the gibbet, for they may be somebody's darling. A collection skinned and tanned make a charming motor rug, but it is unkind to exhibit handicraft of this nature at the local show of produce.

We understand our own vermin, but when it comes to strange countries new conditions are encountered. I confess to little real conception of what particular pests thrive in the United States and eat birds or eggs; and I have every sympathy for the English keeper who accompanied a consignment of pheasant eggs sent from the Liphook Pheasant Farm at Emsworth, Hants, to the estates of the Maharaja of Patiala in India. He got the eggs there without trouble, hatched them successfully, and then found that on the first night a mongoose killed ten, the next day a cobra ate a few, then monkeys plucked another, and the local turkey buzzards and kites assembled in a swarm to carry out a mass attack on the surviving chicks. No specific veracity attaches to the zoological accuracy of this tale, but undoubtedly new strange and forbidding varieties of vermin made conditions in India very different from the routine of keepering in straightforward East Anglia. The development of game resources in the East is difficult if one or more of the predatory animals is sacrosanct and may not be killed without offending religious sensibilities. On the other hand, we need not be unduly stiff-necked about the matter, for the fox is sacrosanct in England.

The natural woodland kept fairly free of vermin, well provided with food and water, supplied with grit, and providentially equipped with roosting trees, represents an ideal covert for the birds, but it is not necessarily a good wood to shoot, for the pheasant requires certain special conditions before he can be shown at his best—as a thoroughly sporting bird able to beat the poor shot, and usually difficult enough to defeat a number of shots who are good if not crack performers. In the days of muzzle-loaders our forefathers went out with spaniels or other dogs who routed up pheasants from the hedgerows, long stubbles of those days, or the undergrowth of the woods themselves. The birds were shot in covert or walked up. This form of shooting does not furnish great sport to the modern generation with breech-loaders, but it was undoubtedly good fun in the days when muzzle-loaders made shooting a slow and ceremonial affair.

Today we drive our pheasants and bring them over guns at their maximum speed and at the greatest height we can contrive within the measure of our ground. This involves the use of carefully planned coverts, special devices, and the use of a line of beaters. In parts of the United States where pheasants have become common the beater is almost an unknown phenomenon, and shooting is still carried out in the old walking up methods. Conditions of labour, the natural lay-out of the land, and other factors may for a while maintain this limitation, but even in a wild shoot it is usually possible for a man and a brace of dogs to drive pheasants over the guns. The principles applied in covert shooting apply no less to the wild shoot. Necessarily they have to be applied on a restricted scale, but once driving is practised on even the smallest scale, its sporting virtues become so manifest that the pheasant earns the recognition he deserves as one of the best sporting birds in existence. Whether the birds are in scores or braces, get them up high, for one really good, clean, difficult kill is worth a dozen walked up easy marks. This is the best advice one can give to the American sportsman who has acclimatised the pheasant but has not yet the resources of European shooting to command.

The pheasant is by choice a pedestrian. He will run rather than fly if not too actively disturbed or if his movement is not restricted. It is on this factor that we base the conduct of a day's pheasant shooting. The birds can be concentrated in woods or plantations, and when disturbed by the beaters they fly over the guns to another wood. This "other wood," the destination, is the

predominant factor of all systematic pheasant shooting. The art is to move birds at will from one place to another, getting them as high in the air as possible at the point where they pass over the line of guns between source and destination.

On a small shoot, where the bulk of the birds are concentrated in one main home or central covert, it is usual for the keeper to drive out the birds on foot to the more distant coverts or plantations early before the shooting begins. A little steady tapping will set the birds on the move. Flankers control the lateral spread, and a competent keeper with a good staff can drive birds exactly where he wants them as a preparation for the day. The men "tap down" intervening hedges, and here and there a boy is left to tap or stop with a flag and keep birds in the concentration areas.

The rotation of stands is so designed that birds are moved from one covert to another over the guns before reaching the central home. This may or may not be shot according to the time of year, or the decision whether it is a "big day" or a small one.

On a larger estate the woods may be more plentiful, and not only the home wood, but many others may be separate beats under the control of an assistant keeper and carry their own stocks of birds. Here it may not be necessary to move the birds out to outlying coverts before the drive. More often all that is necessary is to keep the birds in from daybreak, and by placing stops and driving down the hedges prevent them leaking out of the natural concentration areas and spreading out over the fields to feed.

There is a considerable difference of outlook between the forestry expert and the game preserver, but these two divergent points of view can be reconciled. For shooting we require small manageable areas of wood. The imaginative forester has a passion for big blocks far too big to be successfully driven. The compromise is to lay out the plantations with strips of forty to sixty yards between them. Plantations laid out in the elongated shapes of the letters E or L are excellent for game, as in spite of their size they can be taken as manageable beats down the long limbs, and can further be driven in any desired direction. By careful planning the plantations can be kept separate by wide belts or fire strips, which will not only reduce the dangers of fire losses, but allow the woodland to pay its way on its annual crop of game.

In the same way, where an estate is already heavily wooded but not developed for game, the first consideration is to cut the timber blocks into manageable sections. This requires a good deal of careful consideration if it is to be done in the best way. The old system was to cut rides straight through. Today we always leave a thin screen block at the end of each ride. This serves not only to make the cover warmer by preventing direct wind access, but allows game to be moved on foot across the ride in a "blank drive" when necessary. If the ends are open birds will often rise or break back rather than cross the narrow open space.

The old very narrow ride has now given place to a wider cleared belt where undergrowth is reduced but high timber is left standing. This cleared zone should extend some forty yards from the ride or path on which the guns stand, and it should not carry too much tall timber.

The junction of the uncut woodland and undergrowth with the cleared zone is the flushing line. It can either be left natural or a belt of low wire netting can be run along. If netting is used it can be run in V's in order to concentrate birds at particular points; but the V system has its disadvantages, as birds tend to get crowded and rise in a sudden mass flush instead of coming nicely in small packets. It is far better to set the flushing belt in a round, wide curved U, with wings set fairly well back. Birds will then run round the edge of the netting and move back toward the beaters, then cross the curve and begin again. They keep on a circular "milling" movement, do not crowd and do not flush—provided the beaters and flankers advance very quietly and only tap occasionally.

In front of them is the cleared zone, cleared sufficiently to do three things. It must show from a bird's-eye ground-level view at the flushing belt a good deal of clear sky; it must still provide cover enough to conceal the distant guns completely from this belt; and it must have a screen of standing timber near the belt to make the birds go right up high at once. Specially important, there must be a destination—in this case the next beat or section of the wood beyond it.

Whether laying out stands in woodland or outside, these principles of well-set-out flushing points, clear sky, screen trees, and cover for the guns must never be forgotten.

Where woodland is on slopes or hills the same principles must be employed, but it is not easy to drive birds downhill, as their natural instinct is to run to the top. Hillsides often produce situations very difficult to manage within the limits of the ground, and it is usually best to take them longitudinally if they cannot be driven up and over from the opposite valley. Concealment of the guns is extremely important even in woodlands where the slopes are not severe. Birds can, it is true, be driven over exposed guns, but they will tend to flush in big batches, where if the stands are well sited under cover they will give intermittent rises to good height.

A ravine, stream bed, or even an old hedge trench running diagonally through a wood is often the unrecognised cause of drives going wrong. Birds will leak along it under cover and get back behind the beaters. Here short pothook-shaped stops of wire netting some twenty yards long may be used to trap and divert the stream.

It often happens that natural wild woodland is not provided with placed rides. In the case where a big estate has been cut up into smaller ones the original lay-out may not be adaptable to the new needs. A shooting tenant has no power over forestry affairs, and the big blocks may prove unwieldy to handle without an army of beaters. Here we make use of the sewin. A sewin is simply a length of a hundred yards of stout cord into which is knotted at every foot length a few long feathers or a piece of coloured rag. It can be bought or it can be home made. Several hundred yards of this elongated scarecrow line are wound on a light reel in a stirrup frame which hangs round a man's neck.

The function of the sewin is to act as a stop to keep game within a boundary, or it can be used as a flushing device. The line has to be sited and pegged out with three-foot hazel wands at intervals of a dozen or so yards. Each wand is split at the top. The man carrying the sewin goes down the line unreeling and fixing the line into the split wands. Having lined a section, the sewin is unknotted at the nearest joint (usually marked with a special coloured rag or a brass spring eye), and a boy is left to jerk the cord at regular intervals. This keeps the feathers and rags dancing, and few birds will dare run beneath it. An area can thus be enclosed as a beat and handled with a very marked economy of men. The disadvantages are the time taken in laying out and

reeling in, but the sewin is astonishingly useful in keeping down expenses on a small shoot, and is indispensable for handling wild woodland not well laid out for driving. It can be used with advantage where springer spaniels or hunting dogs are used to drive and flush game, and may prove to be of value for adaptation in the United States in areas where beaters are scarce.

The pheasant, although a bird of the woodland, spends his day mainly out and about in the field and hedgerow. In the earlier part of the season we take an occasional toll of birds when walking up for partridges, but outlying copses and small double hedges are best shot fairly early, particularly if they are near roads and likely to tempt that mechanised vermin the motor-poacher. The permanent tenants of these hedges and small spinneys are as a rule wild birds which have been hatched there. If a small early day is thought desirable, the coverts proper should be stopped in from early morning, and spinneys, boundary hedges, and outliers tackled not only with beaters but with adequate dogs. While the leaf is on and bracken uncut by frost, pheasants will lie like stones, and the heaviest beating will not always get them up. A good working dog, on the other hand, will move them rapidly. In some cases hedges can be driven down to spinneys or doubles, and the birds can be driven out, but in the main these first days are just rough shooting.

Jealousy between neighbouring owners about birds is not unknown, but jealousy between adjoining keepers is almost universal. Boundary shooting should be very scrupulously conducted, and a joint day is possibly the best solution. Certain crops have an attraction for pheasants, and nothing surpasses a field of mustard or belts of Jerusalem artichoke. The estate owner may legitimately use these to keep his own birds at home, but their occurrence near a covert on adjoining land where birds are not reared may be taken at its face value.

The date on which the coverts can be shot depends on their nature. A good fir plantation or a mixed plantation with lots of fir will provide a good early shoot in mid-October. A hazel, chestnut, and oak wood copse or woodland will seldom be really fit to drive before mid-November, and beech woods with thick brackens depend entirely on the frosts and autumn gales. It is a matter of undergrowth and visibility.

Early covert shoots should be considered from this point of view, and birds

should be concentrated not in impenetrable thickets where the beaters can only move a few out, but in plantations or woods where there is less holding covert in the shape of undergrowth. By December these will be very bare and hold few birds, and they should be taken first.

The question of what under-covert to encourage depends on the soil. In East Anglia beech, slashed half through and bent down to grow longitudinally, and privet do well under dense shade. These with small spruce and Douglas fir make excellent under-covert. On some soils common sallow is excellent and can be cheaply started from spring cuttings pushed into the soil. Undergrowth as distinct from under-covert is best met with brambles, broom, and snow-berry, all of which are very fairly rabbit-proof.

One of the best food plants is the *Rosa rugosa*, or Japanese rose, which carries enormous hips. If these, crab-apple, and wild cherry are planted round a covert, they provide not only excellent covert but food. Blackberries, hawthorn, cotoneaster, privet, elderberry, and mountain ash are all excellent food trees. The improvement of a covert is best decided by the selection of the species which seem to flourish naturally and supplemented by the trial of others which may prove adaptable.

In a game covert the great aim should be to protect the inside against the prevailing winds and gain the maximum of warmth by planting quick-growing trees as an effective close windscreen. Bare interior patches should be planted with food under-covert and firs which will in time make roosting trees. Rhododendrons are best avoided. Where there is a heavy shade canopy and growth has died out, judicious felling is the only remedy, but temporary expedients may be tried. Bramble or loganberry can be planted and allowed to climb over piles of branches or dead wood, and clumps of *Polygonum cuspidatum* or other screen plants can be tried. Gun screens take time to grow through on some soils. Lombardy poplar or willow will shoot up in a year or two. Where there is absolutely no gun screening, hurdle butts as used for partridge driving should be adapted.

The posting of guns on a shoot is a matter for very careful thought, and stands vary according to the time of year. In general, wind affects pheasants very little, but it should be taken into consideration when the highest and most difficult birds are required. A pheasant seldom flies straight; almost invariably

he curves right or left, and if you can site your guns behind a tall tree belt twenty or preferably forty yards from the covert edge, you will have your birds rising high to clear the screen trees and attaining their maximum height and speed at forty yards from the rise. They will then sail over the guns on their downward glide—and with a curve on them.

Very little noise from the beaters is needed, the less the better. They should advance slowly, steadily, and in perfect front, with frequent halts to allow birds to run on in front of them to the wire flushing points. Right and left of these flankers should be posted with flags or tapping stones in order to prevent birds breaking out sideways. It is better to economise in beaters than do without flankers at the front of the drive.

A big pheasant shoot will require eight guns with two guns apiece. Many will bring their own man to act as loader, etc., but it is important that anyone detailed to act as loader should be familiar with the task. The keeper likes to get his guns quietly into position and then begin the beat. In very cold weather, and particularly when guns have driven long distances in cars, he will increase the bag at the first stand if, in place of posting them at once and keeping them waiting in the cold, he marches them a half-mile—an unnecessary half-mile—in order to warm them up !

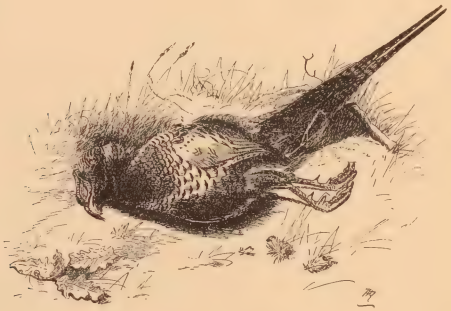
In all cases the positions for the day are found by drawing numbered strips, and with each successive beat guns move up two places—*i.e.*, No. 3 gun on the first beat is No. 5 on the second—and this rotation is maintained throughout the day. Exceptions are sometimes allowed when a gun has to be " back with the beaters " and this involves a long walk. In the interests of the time-table it is sometimes better to detail a younger or fitter member of the party to the task.

The expert shot at a drive usually takes his birds at the particular angle which suits him best. This is a special knack and it involves not only very good shooting but very precise timing. The first right and left have to be dropped neatly, the gun swung back and changed for the second gun, and the second brace selected and dropped. It is easier to write of it than to accomplish it, for the birds may be in a bewildering, irregular flush, or intermittent. Quick decision and footwork is essential.

A less expert shot will often fire many more cartridges to birds bagged

than the seemingly more leisurely and unhurried "crack," but the spectator will note that the crack as a rule selects his birds within a particular angle of front and neglects others. He is also quicker with his first barrel, and usually kills his number one at a longer range than his less accomplished neighbour. He is quicker on to his birds.

The besetting sin is firing behind and below birds. They are hardly ever missed in front. It is an infectious and nervous complaint, but it can be largely overcome by iron resolution not to shoot at the bird—but at his beak. High pheasants are not high enough to be out of range even when right over tree-tops. Fifty feet is a good height for a tree, and a hundred and twenty feet is certain killing range for a normal game gun. There are, however, one or two special mountain shoots where a bird rising from hillside and gliding across a narrow valley may be almost, if not quite, out of practical range. Even there it is the great difficulty of accurate shooting rather than range which accounts for the escapes, and the knack of killing even the super-high bird can in time be mastered with practice.



V
PARTRIDGES

September : Partridges with a Frenchman Leading.

Chapter V

PARTRIDGES

THE partridge is a bird that most of us secretly or openly prefer to the pheasant. The latter is admittedly far more economically satisfactory, but there is something genial and lovable about the partridge which is lacking in the pheasant. It is, for one thing, a true native of the soil, and not a semi-oriental immigrant. It is definitely squirearchy and a commoner of pure blood, and not a titled profiteer. It is the familiar "little brown bird" of our pastures, and was known to the ancients, being mentioned in Aristotle, though moderns will disagree with Pliny's statement that the partridges found in Paphlagonia have two hearts, and many will deem it improbable that the assumption of some of the early Fathers that Satan often took the form of a partridge is founded on careful observation. True, I have known them apparently possessed of the devil, but rather to the exasperation than the temptation of mortals. That temptation may occur in the form of perfectly *roast partridge* and the accompanying perfect bottle and a delightful but tentatively imperfect companion, no one can deny or few regret. It was either Binstead or Pope John XII. who coined the phrase: "A bottle of 'boy' and the bosom of a tender bird." It must be admitted that on occasion there is no better menu for a victim of despondency.

The partridge is one of the earliest birds to remind us even when winter holds us fast that spring is not far off. When weather is mild, they will pair early in the New Year, and a prolonged courtship is carried on until nesting begins in May. The law allows partridges to be shot until February 1, but in practice they are not shot by sportsmen after December 31.

The ancients had a good deal to say about the amorous propensities of the partridge, but actually they are most respectable and faithful birds. The pheasant is not only polygamous, but takes full advantage of propinquity.

The partridge, on the other hand, is delicately sentimental about the choice of a mate, and is monogamous and selective. This fact makes it extremely difficult to breed partridges in captivity. You may associate a number of cocks and hens, but if the young people do not happen to hit it off, your labours will be in vain and your alluring nesting sites productive only of infertile eggs. Affection rather than opportunity is the motto of this modest little bird.

For many years our grey partridge was known as *Perdix cinerea*. Then some systematologist got busy and proved that by all the conventional absurdities of priority which systematologists accept as rules, the bird ought to be called *Perdix, Perdix, Perdix* (L.). I regret the passing of the older name, for I have loved thee, Cinerea—in my way.

We have two partridges in England, the ordinary partridge and the French or Guernsey partridge. The latter is incidentally not a true partridge at all, but a related species much more closely allied to the *Chukor* of Near Asia and the Indian hills. Known as the " Frenchman," or red-legged partridge, the bird was for a long time *Caccabis rufa* ; now it appears to be technically *Alectoris rufa rufa* (L). The two species are distinct in appearance, and to a certain extent dissimilar in behaviour, but both have their virtues. For a long time the " Frenchman " was discredited as a sporting bird, and it is rather an interesting instance of ultra-conservatism in the acceptance of tradition.

In the days of our grandparents partridges were mainly " walked up " and not driven. Now the red-legged Frenchman, when alarmed, tends to run a long way before he rises. This characteristic called forth the heaviest curses from our grandparents, who ranged the stubbles under the hot September sun and saw the intelligent Frenchman rise well out of shot and whir across the hedgerows to the next patch of roots a quarter of a mile away. Today there is little walking up except on small rough shoots, and we drive our partridges. As a result the despised Frenchmen are very often the first brace over the guns, and they fly as a rule well and strong. It is, I believe, rather easier to hand rear Frenchmen than the others, and where depleted partridge stocks have to be worked up this may be a useful hint, for it indicates that the birds are less sensitive to food conditions than *P. cinerea*.

The ordinary partridge is not confined to Great Britain, but is found widely distributed across Europe, and is identical with the Hungarian partridge,

whose eggs we occasionally import to make up stock. Its southern limit is, however, barely down to the northern littoral of the Mediterranean. The red-leg, on the other hand, is the common partridge of Southern Spain and Northern Africa, and there are many sub-species which vary but little from the general type. The bird may do well for acclimatisation in suitable environment, and, despite its running characteristics, is nevertheless suitable for sport in a non-driving country, for after a first run of some three hundred yards or so it squats and then flushes well.

There is no easily discernible outward and visible sign of sex in the plumage of the ordinary partridge. Many of the older school were convinced that the familiar horseshoe-shaped patch of chestnut on the breast was a distinguishing sign of the male bird. Guns actually shot these marked birds fairly late under the impression that they were killing off the older cocks, but it is wrong.

Partridge plumage varies enormously. You get birds with the horseshoe, birds with plain ash-pink breasts, and birds with partial chestnut markings. They may all be of either sex, and the truth is that the horseshoe has no evidential value, but is believed by ornithologists to occur with a slight preponderance in favour of young hens, and by shooting men to show a decided bias in favour of cocks.

The minor plumage variations of the partridge are very wide, and though one may identify the sex of young birds fairly accurately by Ogilvie Grant's rule, I doubt any certainty in its application over a long series of old birds. Hens which are past their climacteric tend to assume more masculine plumage, and birds which have been pricked by shot or suffer from any ovarian abnormality may present variant characteristics. In addition, there are wide local variations between the birds raised in one kind of environment and those in another. The plain breast sometimes spoken of as a white horseshoe is common in East Anglia, fairly rare elsewhere in Britain. Lastly, and most important of all, as the season advances plumage changes occur, and November often produces birds in an intermediate stage when there is a mixed feathering of the wing covert, and feathers characteristic of both sexes can be plucked from the wing of the same bird.

The Ogilvie Grant rule is that the middle wing covert feathers show a narrow central buff stripe down the shaft and *no cross-barring*. The female

has a slightly wider buff stripe with well-marked cross-bars. Though not by any means infallible or easy of interpretation in some cases, it will, however, serve well enough as a sportsman's rule. The first-year French partridge cannot have its sex determined without dissection, but the older cock bird shows a rudimentary spur which increases in size but not in length as the bird ages. The rule for telling the age of partridge is easier. One can tell easily by beak and feet when the season is young, but as it advances this is less easy. The real test is the point of the first primary feather. This is pointed in young birds, rounded off in older ones.

Despite early pairing, laying seldom begins before mid-April, and one only begins to locate the nests on the estate during the last week of April, or more usually the first fortnight of May. As a rough rule one can allow forty-five days for the full process of laying, sitting, and hatching. The number of eggs varies from a dozen to over a score. The average is fifteen to sixteen, and where twenty or more are found, it is probable that two hens have begun laying in the same nest.

It is very important that as many nests as possible should be marked down, for if we want to conserve or increase our stock we must protect the nests, or, on the Euston system, let the bird sit on imitation or pot eggs while we hatch the real ones to chipping point and then replace them under the partridge hen.

A dry, thick hedgerow is the favourite nesting site, but open nests in hay or clover or in broom and gorse thickets are fairly common. Nests are not too easy to find, for the bird while laying keeps the eggs covered with dead leaves except when she is on the nest. She is only on it while laying, and it is often difficult to detect the exact spot until she either leaves the eggs uncovered on the last day before she begins to sit or until she begins sitting. In looking for them one looks more for the trodden track or path made by the bird than the eggs themselves.

Every nest noted should be marked on a tracing of the estate map. If we find a nest, say, on May 12, with six eggs in it, we can calculate the date of hatching by allowing rather less than a day and a half per egg in order to work back to the starting date from which to calculate our forty-four days. In this case we can estimate she began laying on May 3, and will hatch on June 16. In practice I allow a day's tolerance on each side, but the dating seems to work

out very accurately as a rule, though it may be on occasion set back twenty-four hours or so by a hard cold spell at the end of May. When weather is bad I think the indication is that an egg or so less is laid rather than that there is any interruption of the time factor of twenty days to lay, twenty-four days to hatch.

The red-leg or French partridge has a shorter period of incubation, only taking twenty-three days. If one mixes red-leg eggs with grey this factor must be allowed for, or the Frenchmen will hatch first and the hen will go off with these chicks, abandoning her own. This is, I think, the reason that we never seem to meet natural mixed coveys of grey and French, despite the fact that the hens will undoubtedly lay together in the same nest. Unlike the grey partridge, red-legs do not cover their eggs, and so suffer more heavily from vermin.

The day of egg exposure is the signal that laying is over and sitting about to begin. Why there is a day's exposure is not explained. We can understand the covering of the eggs, usually held to be for protection against discovery, though it may be just as important that moisture evaporation is checked and equable temperature conditions are maintained, but the uncovering of the eggs for a day is mysterious. It may be that exposure to daylight and solar radiation is important, or it may be that it is some psychological reflex as a prelude to sitting on the part of the hen. I have a theory that the day's exposure is necessary in order to get the eggs into equal condition—that is to say, to average up the last laid with the first and get them all, so to speak, set on the starting line. It would be interesting to experiment with this and check the effects of exposed eggs as against unexposed eggs under artificial hatching conditions. It is possibly a point which would yield information useful to us for intensive rearing.

The first week of sitting is a very critical period. During this time the birds are very easily put off the nest and will often desert if disturbed by a dog or boys. After the first week a grey bird seems to change nature and becomes a steady, placid sitter (though a French partridge hen is wild to the end and must be left quite undisturbed). Nothing seems to disturb *Perdix*, and you can actually stroke them on the nest. This steadiness leads to those tragedies of the reaper when clover and hay are cut and birds are accidentally killed

sitting on their nests. Known nests in precarious positions should be marked out with a stick when reaping begins, and if a tuft a yard or so square is left with the nest the bird, despite all the disturbance, will probably hatch, although the rescued nest is, once the field is mown, painfully obvious to vermin.

The protection of nests is carried out in various ways. Some keepers use one of the tainting liquids, which are mixtures of a waste residue from tallow or animal oil factories and a phenol preservative. Others put a wire netting cylinder with a hole for the bird to get in and out by round the nest. These measures protect against foxes, and wire is a defence against winged vermin, but is not very effective against rats, stoats, or hedgehogs. Nature helps to a certain extent, as a sitting bird gives no scent. The best measure is, I think, to use insect powder on all nests, as this not only helps to moderate the infestation of the bird with lice and the consequent dangerous infestation of the chicks, but it also seems to act as a deterrent to vermin. Powdered naphthaline in combination with flowers of sulphur and pyrethrum powder appears to be effective in this dual capacity.

The main hatch occurs from June 15 to 25, and more young partridges are believed to be hatched on Midsummer Day than any other day in the year. The proportion of the hatch is variable. Late frosts certainly mean a poorer hatch; rain does not seem to affect it. There are, however, many other factors, dominant among which is the age of the birds. Young second-year hens and young cocks mate well, but every further year diminishes their potency. This makes it very important to shoot down the old stock—always providing that there is enough young stock left to take its place.

The weather from the middle of June to the middle of July is the dominant factor in determining whether it is a good or a bad season. This is not, as older writers suggest, entirely a matter of rainfall, but of several factors. If we have, as we so often do, torrential thunderstorms in July, we have losses from mechanical factors. The chicks are drowned out in the growing crops. If we have sustained cold wet weather with absence of sun, we lose birds from chills and conditions of lung congestion analogous to pneumonia, although true pneumonia is one of the rarest diseases among birds. We also lose many on heavy clay soils, because the clay " balls " on the chicks' feet and they get left behind the unhampered section of the brood. Lastly, we get a general weakness

and predisposition to infection, which accounts for many of the losses attributed vaguely to a specific partridge disease.

A summer of drought may spell ruin to crops but has never been known to be a bad year with partridges. Water shortage does not seemingly affect them. On the other hand, a drought year is often bad for reared pheasants. The latter are on a limited rearing field and in receipt of artificial diet, while the partridges are on free range and wild diet. There is obviously a wide difference in the amount of insect food each gets, but this is by no means the whole story. I have little doubt that a vitamin factor is really involved. Pheasant chicks will not thrive even in a sunny year on pasture where drought or night frosts have restricted the growth of new young vegetable elements. We get " cramp " in pheasants both in dull, wet, sunless years and in years of drought, when the pastures are poor and cows are not yielding their normal milk flow, and their milk is lacking in certain vitamins. The partridge on free ground and wild diet does not get this trouble in a drought year.

Wet, with sustained cold winds, is the most fatal factor, for it not only chills the chicks, but limits the hatch of insect life and renders the conditions of the search for food far more arduous. The absence of sunlight has its direct effect on the growth-control factors, and the surviving chicks are open to disease. Modern opinion is rather against the idea that parasitic nematode worms are a potent lethal factor in birds. Most birds are infested with several species, but these seldom appear to have any serious effect except when associated with coccidiosis. The latter and gapes are the main sources of parasitic loss.

Trichostrongylus tenuis, *Heterakis papillosa*, and the larger *Ascaridia compar* occur both in partridges and pheasants, and in my experience are common enough in perfectly healthy birds. Infection with coccidiosis, however, appears to produce a condition in which some of these nematode parasites increase and add to the trouble. In quantity they both secrete toxins, and represent an additional drain on the bird's system, while where violent gut inflammation from coccidia is present they are probably capable of destroying the tissues and penetrating the weakened gut wall. The report of the Grouse Commission stressed the effect of *Trichostrongylus pergnacilis* as a source of grouse disease, but it is an opinion which may have to be very largely reconsidered in the future. Strongyle infection, unless accompanied by coccidiosis,

seems to be resisted fairly easily by the normal bird, and so far no real case has been made out for it as a serious lethal factor with partridges. We know very little about partridge diseases, for once hatched we seldom see the birds again till the shooting season in September. I have vainly tried to keep track of the fate of coveys hatched in my own garden, which have dwindled from the original sixteen chicks to a mere half-dozen survivors on September 1. We seldom find young dead birds, for they die, as is their habit, in cover. I have picked up young drowned birds, and I have found birds dead from unknown causes—but very few are recovered in such condition that a post-mortem is likely to disclose the source of death. Last year, 1928, birds hatched well; the season seemed in every way favourable, and it was an excellent harvest year, yet in many places broods which were well grown apparently died off. I examined a number of casualties and found coccidia in 75 per cent., syngamus —gapes—in the others. Both infections were present in many cases. Nevertheless, the amount of material of this nature which has yet been examined is very much out of proportion to the enormous losses which occur but are not noted. A disease similar to the entero-hepatitis of turkeys is also a very probable source of loss, and it is possible that live ants are the best natural defence against this affection.

The first fortnight is the most critical time for the chicks, but at a month to five weeks, when feathering is almost complete, there is seemingly a second critical period. The drain on reserves during the rapid feathering is probably excessive, and a cold spell and its effects on food are probably felt more seriously at this point than either earlier or later. By the end of July most coveys can fly for short distances, and barring casualties from vermin and during harvesting operations one may deem them fairly well established. The liability to disease is, however, still maintained, though these part-grown birds are undoubtedly more resistant. Unfortunately, farmers now put poultry out on the stubbles, where not only do they consume the food-supply which was of old the partridge's mainstay during the earlier part of the autumn, but they foul the ground with coccidia which they carry as permanent parasites. The decrease of stock is due in part to this wider field of disease distribution.

The factors which apply to the grey partridge also apply to the Frenchman, and I am inclined to think that of the two birds he is the less resistant to disease.

The French bird was, according to Lord Leicester's researches, introduced in 1673 in the time of Charles II. and set down at Windsor, and again in 1770 by the Marquis of Hertford, who put them down at Orford in Suffolk. Since then they have been tried all over the country, but do not seem to flourish except on the dry sandy areas of the East Coast. A light rainfall and a very high sunshine radiation factor appear to be essential to their well-being.

The French partridge may, however, be reckoned a successful introduction, but attempts to introduce other varieties of partridge like game birds have failed. We have had from time to time, notably in 1888, invasion waves of Pallas' sand-grouse, *Syrrhaptes paradoxus*, which has bred but not taken on. Chukor have been tried and showed some success, but neither the Norwegian hazel hen nor the Francolin nor any of the apparently possible birds tried have ever made headway. In some cases it may be the climate is too cloudy; in others, perhaps, the environment is too crowded and disturbed, but it must be admitted that the partridge kin and cousins are difficult birds to please.

Perhaps we ought to expect to fail with foreign birds, for when all is said and done we really know remarkably little about our own. Food is estimated by Dr. Colinge as 40·5 per cent. insects, including 23 per cent. injurious insects and 53·5 per cent. vegetable food, of which only 3·5 per cent. is grain and the greater proportion weeds and weed seeds. In general, casual examination of crops shows a very high ratio of vegetable food, often clover or trefolium leaves, and charlock and other weed seeds, and in late autumn often shoots of wheat. This plucking of wheat is probably not harmful, but may be beneficial in causing the production of several stalks in place of one or two. The general opinion of farmers for generations has been that partridges were beneficial to agriculture, and there seems to be every reason to believe that they are even more useful than is generally known. The food of the French partridge appears to be very similar, but no analytical survey seems to have been carried out in this country. In view of its association with lands where there is greater aridity and possibly a higher proportion of insect life, it is possible that the young birds thrive better on a slightly different proportion of insect to cereal food than that customary for grey partridge chicks.

Yarrell and other older authorities record crosses between grey and French partridges, but there is no reason to believe that this has ever occurred. No

authentic hybrid is known, and as the birds are of different species such a cross is unlikely, and even more unlikely to be fertile. Immature French birds from late nests sometimes look rather like a mixture, but this stage soon passes.

The problem of increasing a stock of partridges is a difficult one. Given a series of moderately favourable seasons it can be done fairly easily with good keepering and on suitable ground. Weather cycles are, however, sufficiently well established to worry meteorologists. As men of science they do not hold them to be satisfactorily established, but they hope that after another century or so of weather recording the actual length of the cycle will be established. So far as Great Britain is concerned, the sun-spot cycle does not affect the partridges, for, despite all belief, a good harvest year is not necessarily a good partridge year.

The years 1895 and 1897 were bad harvests and good partridge years; 1909 was a very good harvest and a very bad partridge year; and the same is true of 1921. If we plot out the partridge curve we find some kind of a cycle which runs very fairly closely to nine and a fraction years, and corresponds with general records for the last half-century. In its present state any cycle is not accurate to a year, but it indicates that if we plot a regular saw-tooth diagram back from the end of 1930 and beginning of 1931 as a future good year, and give it a period of nine years and rather less than a month from maximum to maximum, we find all the good partridge seasons grouped at the apices of our peaks and within the top third, and all our bad seasons at the bottom troughs of the teeth in the lower third; and you can run it back fifty years and still find it holds good.

It is not sound enough for year to year forecasting, and it is from the scientific point of view simply a string of coincidences taken over too short a time to have any real value. On the other hand, viewed from the sportsman's point of view, it has this advantage. It indicates groups of three years when the expectations of good partridge seasons are high, and equivalent three-year groups when they are bad, with odds of at least six to one that the forecast is right. I do not trust it to a year, but where it comes to a three year's lease of a partridge manor I should be inclined to give it consideration as a forecast of partridge expectations. According to it the group of years 1930-31-32 shows hopes of general improvement and a succession of good seasons. Let us hope it turns out to be true—for we need it.

There are several systems of increasing the natural yield, and they depend on the size of the shoot and its staff. On a small shoot which is mainly pheasant covert and the keepers limited, time may not be available to run a proper partridge system. Here the best way is to add a certain number of Hungarian partridge eggs at the right time to the natural nests. The sale of English partridge eggs is rightly frowned on because they are necessarily stolen eggs from someone else's land. Most game farms can, however, supply Hungarian partridge eggs, which are exactly the same bird *Perdix, perdix, perdix*, imported from Central Europe. In other cases one's keeper can sometimes arrange exchanges of pheasant for partridge eggs with neighbours, but such an affair should be sanctioned by both owners as well as their keepers.

Hungarians are expensive, and the system of trusting them to wild nests is not always successful, but where labour is short it is worth trying when stock is dangerously low and the birds on the land old and of low potency.

The normal system is the Euston system, and it is excellent if it is not overdone. Essentially it consists of taking all wild eggs, hatching them to chipping point under hens or in incubators, and replacing them at the critical period under the wild hens who have been sitting in contented deception on "pot" or artificial eggs. It is not expensive, but it requires good handling and involves a lot of labour on the part of the keeper. In the past as many as twenty chipping eggs have been set under a hen partridge to become a natural covey. This is too many, and fourteen or fifteen chicks shows a higher result as casualties are reduced.

The gain from the Euston system is not only the elimination of danger to the eggs from vermin, but there is also a substantial gain in time. In place of the hen partridge having to sit for twenty-one days, she can be given chipped eggs at the end of ten days, that is to say, as soon as she has got over the first sensitive period when she may desert if disturbed and is sitting hard. This gain of a fortnight before the July storms break is enormously valuable.

If one sits one's first collected eggs under hens in mid-May they will be ready to go under the partridge during the first week of June, and a clear fortnight may be gained. The timing of the eggs is important, and readiness is shown by a single chip—when the egg will hatch in twenty-four hours, and those with a double chip, which will hatch in twelve hours. Some keepers force eggs

on by putting them in water at blood heat till the inmate begins to peck hard, but it is, I think, a doubtful expedient.

The collection of the first or early eggs is important, but no nest should be touched until there are at least five eggs in it. The hen partridge is unusually suspicious when she lays her fourth egg, and it is wise to wait for five before replacing them with pot eggs—the replacement is far less critical. The chipped eggs are kept warm in hay or bran with a hot-water bottle, and the keeper goes round gently moving the hens off their nests, collecting the pot eggs and putting in the chipped real ones. If properly timed they all hatch in twelve hours or less, and are taken charge of by the hen, and in the case of grey partridges by the cock bird, who shares all family cares. Old bachelor or widowed cocks will often take charge of an incubated family, and this instinct is sometimes made use of by keepers who have birds kept on the "French" system but which have not paired.

The hand rearing of partridges gives very variable results. On ground where there are plenty of meadow ants available it is not difficult, but it is more difficult on the heavy clays, which is precisely where you are likely to need to hand rear owing to shortage of natural stock. Hatching under hens or in incubators presents no difficulties, and the average hatch is far higher than it is with pheasants, but the food problem is difficult. In general the birds are given foods similar to those used for pheasant chicks, and live ants and ant-eggs, chopped egg and chopped greenstuff. The real ratio of the food required is not yet ascertained, and the function of the ant diet may be more useful as a source of formic acid as an intestinal disinfectant than as a foodstuff. Experiment with formic acid on turkeys and pheasants indicates that this is so, but I have not yet tried it as an element in an artificial diet for partridge chicks.

The trouble about hand-reared partridges is turning them down. If we hand rear till they are six weeks old they tend to hang about the place when turned down, or the coveys congregate in one great pack. It is far best to set them out in coops as early as possible, placing these at the edge of a corn-field. If all goes well, sooner or later wild birds will appear, cocks as well as hens, and call the chicks away. This is all for the best, for they undertake their education as true wild birds.

The French system is one which is very little practised in England, but

which gives good results if it is very intelligently handled. In most cases it has proved disappointing, but when stock is really low it offers certain attractions. Unfortunately, it is expensive, and even where it has been practised on well-equipped game farms it has not proved very satisfactory in point of the economical production of stock. The average yield of young birds is about ten to a brace, though in some years far larger broods are successfully brought off. Twenty-five pens represent a practical unit, for if fewer pens are used the labour and capital are better utilised in working up a beat on other systems.

A big 40-yard pen must be built on suitable rough-cover ground and roofed with fruit netting. Hungarian birds, cocks and hens in equal numbers, are wing brailed and turned out in the pens in late October. Small rearing pens are provided as part of the main pen, and when a pair definitely mate in the spring they go apart from the others and take up residence in one of the small apartments. When this occurs the small pen is shut off from the rest by a string operated trap-door, and the mated pair left to nest and rear. An alternative method is to trap the mated pairs in this way but to move them at once to a rearing pen on the ground where you wish to liberate the covey later. This avoids having to move the old birds and the family later.

The advantages of the pen system are that if the birds mate well the yield of fertile eggs is often more than double that of the wild birds. Extra feeding helps this, and the extra yield can be hand reared or used to strengthen stock in wild nests. The disadvantages are that very often the birds do not mate as desired and the stock is liable to be weakly and more prone to disease than the hardier wild bird. Feeding is not properly understood, and the conditions of confinement accentuate trouble. (I suspect that the cause is, as in pheasants, a lack of vitamin balance, and would recommend the experimental addition of dried yeast to existing diets.) On the other hand, the system, if better understood, has great elements of promise, and failing natural recovery of our depleted wild stocks may come to be indispensable.

Apart from increasing eggs, one can turn down wild birds. Hungarians are imported for the purpose. In the past many hundreds have been turned down and the result is looked on as doubtful. Many estate owners believed that Hungarians introduced disease. This is more than possible with birds, improbable with eggs. There were many complaints that Hungarians flew

away or disappeared, but if they are put down in the pheasant pens for a week or two and fed properly into condition after the journey they do as a rule fairly well. If the ground is already stocked with birds they get driven away to other areas, but if it is not too populous and you feed well, they appear to give good results. They seldom arrive in equal sex numbers, and a proponderance of cocks may mean greater local migration than a preponderance of hens.

The preservation of stock during the winter is of paramount importance, and winter feeding of partridges should be invariably carried out and accentuated in really hard weather. Not much feed is required, and it should be large grain to prevent losses from small birds. It will more than pay for itself in the maintenance of strong stock, but should be continued well into April in order to insure good early nesting by well-nourished birds.

One point which is still obscure is the question of watering in dry, hot summers. Some authorities insist on its importance, many practical and successful keepers disregard it altogether. I am inclined to think that if watering is carried out it requires most careful overseeing or it does more harm than good. The habit of birds is to foul water with excrement, and wild birds no less than game birds take advantage of any water-supply put out. If one can insure a non-infective supply it is excellent, but otherwise you are providing the natural moist environment for the spread of gapes larvæ and coccidia. If you water you must disinfect. I have little faith in permanganate of potash, as its effect is very evanescent. A drop or two of tincture of iodine is possibly effective, but a teaspoonful or so of " Milton " or one of the non-poisonous hypochlorite disinfectants is as effective and more economical. In nature, rain, dew, and green vegetables provide adequate moisture for the birds, and they seldom drink at pools or streams. In time of drought a supply is advisable, but it is vital that it should be clean or sterilised. The failure of acclimatisations is, I suspect, often due to neglect of drinking-water conditions as much as any other factor, for anything like stagnant water appears to be a fatal source of infection.

Partridge driving is a specialised art in itself, and it is bound by general principles which have to be applied within the artificial limits of the boundaries and local geography of the shoot. Generally speaking, a double plan has to be prepared so that the drives can be taken according to plan if the usual south-westerly autumn wind is blowing, or on the opposite plan if the wind

is north or east. These two alternatives will serve for all airts. Mild wind does not have a great effect on birds—they will fly with or against it if properly handled—but it does carry sound, and silence is one of the greatest elements of success in good driving; and no less important is the complete concealment of the guns.

The man who has been accustomed to walking up partridges is usually the worst manager of a drive, for he cannot realise that the essential basic tactics are radically opposite. For instance, in walking up a field of roots we take it *up* wind and *across* the rows, as this gives us the best chance of getting within shot of the birds before they rise. When driving we do exactly the opposite: we take it *down* wind if possible, and certainly *with* the rows, so that the birds run on ahead and rise in separate successive flushes, going in the direction we want them to, instead of rising under the feet of the line of beaters in a flurry and often beating back over their heads.

The main object of partridges disturbed by an advancing line is to get not only into cover, but out of sight (which is not quite the same thing) as quickly as possible; thus if three hedges of a square field are low and one is a tall double, it is odds on the birds swerving over the double. The next important point is that the first noise of disturbance attracts and holds the birds' attention. For instance, you cannot therefore line the boundary hedge of a big stubble field, but must line your guns a field or more away. These points seem self-evident—but how often we see them ignored or neglected!

The next thing to remember is that every year sees changes in the ground. The field that was roots this year will not be roots next year. Even more important is the fact that during the short season itself ground changes. Stubbles go under the plough, sheep crop kale, and frost reduces cover. All these factors must be considered, and in addition your keeper must know what farm work is likely to be the order of the day, or the activities of agriculture may wreck a pleasing plan.

The ideal driving ground is the wide sweep of almost hedgeless arable and scanty pastures of the Midland and East Anglian plains. There an enormous beat can be taken in wide sweeps. In hilly or broken country driving is not so easy, for it is seldom possible to drive birds downhill, and guns are inevitably exposed; nevertheless, nearly any ground can be driven—somehow.

In the earlier part of the season cover is plentiful. If it is a late harvest, serious partridge shooting is not possible till the crops are in, and it is, despite the daily press, seldom that the traditional first of September sees a heavy bag. As a rule we begin at the end of September.

Each drive may be taken as an operation of sweeping the partridge population of a group of pastures or stubbles into a field of roots. The concentration accomplished, the beaters advance into the roots and drive the birds out of them over a concealed line of guns. The second drive is usually at right angles to the first, and the last of the successive series of drives should bring the birds back to the original ground from which they started. The guns take toll at each stand, but the birds which pass on take cover in the next patch of roots to be driven. In this way the last drive of the rotation should show the greatest concentration of birds, and show them not as coveys or big packs, but as scattered units rising independently.

As the season advances birds grow wilder and cover dies down or is eaten off. If is often difficult to drive satisfactorily, but good days can be had with great economy of beaters if the principle of the work is understood.

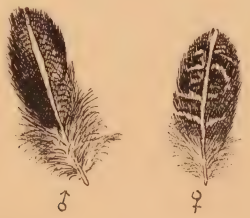
Proper control of the line of drivers is essential in all good partridge driving, and the advance should be as quiet as possible. In practice it is seldom as quiet as it should be, but a good keeper is a quiet keeper, and his men are quiet too. The whole scheme should be detailed to group leaders or under-keepers first, and then the score or more in the line can be handled or manœuvred as the day requires. Rigid adherence to the straight line is to be deprecated. It is far better to move flanks in with an advanced horn down wind. In addition to the drivers there are the flankers with tall staves with flags. These men, by waving their flags, prevent or attempt to prevent coveys going wide at the flanks or over the boundary. They should be well placed, and it should be remembered that the flag shows well over a hedge, and that it is not necessary that the flanker himself should be too much in evidence before birds have focussed their attention on the advancing line of drivers. A careless flanker is one of the greatest causes of birds breaking back.

An average day will provide ten to a dozen drives, and the siting of the guns' positions is very important. Every stand should be marked out and numbered, so that talking and confusion are reduced. Where hedges are low

guns can stand fairly close and see birds coming through the tops, but where they are tall or thick the guns must be set back at least forty yards. A broken hedge may present difficulties, for a part of the line may be unduly exposed. Here hurdle stands or butts affording breast-high cover are the best solution, but it is important that they should not be too high. A forty-yard interval between guns is usual, but where roots can be driven to a narrow front a closer stand gives as a rule a higher bag, unless the birds have to clear high trees and come high. Stands should never be placed in a lane but behind the second fence. The only exception is when this is low and the bank high, and guns so placed would be exposed to view of the oncoming birds.

On strange ground the first few drives are almost sure to be mishandled; but ground can be learnt rapidly, and it will be found that certain landmarks, such as trees in hedges, etc., seem to form natural guide-lines for the birds. It is always preferable to begin with the area where there are most birds, as it does good to break up the heavier coveys to begin with, and the successive drives complete the process; and lastly, it is important that the guns should be good enough to hit driven birds.

It is rather a different art to hitting grouse, but a good partridge drive is but little inferior as a test of skill and no whit inferior as sport. To kill a brace in front, change guns, and kill a brace out of the same covey behind, is not too easily accomplished, but it can be recommended as producing a splendid feeling of well-being and exhilaration.



VI
GROUSE

Capercailzie : "Over the Tops of the High Trees."

Chapter VI

GROUSE

GROUSE in the true sense of the word are found nowhere outside Great Britain, and are of limited distribution even there. The true red grouse, *Lagopus scoticus*, is unique in sporting quality, in flavour, and in adaptation to a twentieth-century economic environment. There are related birds called grouse in other lands, but they are not our own true muirfowl, and despite their popular name they are ineffective spurious creatures of no interest to the sportsman. It is difficult to decide whether our grouse are Celts or Nordic, but practically speaking they are essentially Scotch, with a certain range of extension to the higher northern parts of England and Wales. There were once grouse in Ireland, but now it is a rare bird there, for the aborigines have poached them in season and out of season, and the bag of an Irish moor is about the equivalent of the shearings of a bald-headed man. There is a new and formidable code of game laws in the Free State, and about twenty years from now, always provided that the essential nature of the people changes, an Irish moor might be worth renting.

In the meantime there is Scotland, where moors run at least a four to one chance of being satisfactory in yielding the estimated bag. The first thing to realise about grouse is the operation of the seven-year cycle. This is roughly one superabundant or bumper year followed by a lean year of disease and negligible stock, and slow recovery in four years to good, and again bumper and the ensuing fall. As things are this cycle is unavoidable, for it represents the Scotch character. Nothing will convince a Scotchman that if the nominal average bag or limit of a moor is five hundred brace, he should when a bumper year occurs implore the shooting tenant to do his level best to beg or borrow competent guns from anywhere, and shoot the stock as hard as possible, doubling the limit if necessary. Disease comes from overcrowding, and a

bumper year is fatal. The grouse season is short, for after the end of September you will have to work hard to gather any substantial bag. The only remedy for disease is to shoot down excess stock ruthlessly. There are practical difficulties. Moors are let, and the agreement limits the tenant's bag to so many brace. It does not, indeed cannot, specify that he and his guests shoot adequately. A competent shooting tenant and efficient guests are an asset to the estate owner in good and bumper years. A tenant whose interests lie perhaps more on the social than the sporting side, and who has a house party of really bad shots, may leave so much stock below his limit that overcrowding inevitably spells disease in the following year.

Where an old-established and successful relationship prevails it is possible that these factors are taken into consideration and a give-and-take policy is pursued by lessor and tenant alike. As it is, in bad years the question of rent is usually mutually adjusted by friendly arrangement between lessor and tenant, but the possibility of a bad year should never be excluded from consideration when concluding a tenancy agreement for a season. Scotch law differs in many particulars from English law, but the vetting of a contract by a good firm of Scotch law agents can be recommended as the best form of insurance. The Scotch are a shrewd race, and they recognise the wisdom of clear legal understanding by both contracting parties.

The natural history of the grouse is the only ecological study of game birds which has yet been made in Britain. Twenty years ago the Committee of Inquiry into grouse disease estimated the annual value of grouse moors to be over £2,000,000 per year. Today we should not be far short of the value if we doubled the figure. The grouse is essentially a wild bird, but good moor management has enormously increased the stock which would be carried by a moor in a natural or undeveloped state. The ratio of increase is not too easily computed, but it is not a mere matter of doubling the stock, but an increase of seven hundred to a thousand per cent. For this reason the grouse may be taken as an outstanding example of the effect of game conservation and its importance in the economic life of a country. Without grouse the barren lands of Scotland would yield a poor revenue as sheep runs. The question has been for long a political issue, and much distorted by both parties, but the facts appear to be pretty clearly established that the best-managed moors for grouse

are the best for sheep, and that the capital expenditure which has made possible reclamation of stagnant waterlogged peat mosses and their conversion into rough pasture has come from grouse money, not from sheep. In point of fact the two have mutual interests, and under good management the land is improved not only for game, but for sheep runs and such agriculture as is practicable on the ground in question. Very definitely grouse are more remunerative than sheep, and sheep, unlike grouse, can be grown anywhere else in the world. If one looks at the proposition without prejudice, there appears to be no reason why a fortunately situated agriculturalist, be he duke or bonnet laird, should not grow grouse packs if these are more profitable than turkeys or Buff Orpingtons. Game is a crop or yield of stock just as much as any other commodity raised by husbandry.

The true red grouse, *Lagopus scoticus*, is purely a native of the British Isles, and is believed to have come from the same original stock as the willow grouse, which is widely distributed through Northern Europe. The true red grouse, on the other hand, has a different plumage, a different diet, and different habits. In the past naturalists grouped grouse, ptarmigan, black game, and capercailzie all together under the genus Tetraonidæ, but now red grouse, ptarmigan, and willow grouse have been promoted to a separate genus of Lagopus—"hare-footed"—a distinctive feature of the birds being the finely feathered foot.

The plumage of grouse is subject to very wide variations, and attempts have been made to justify sub-species for various localities. The Irish form of the red grouse (*Lagopus scoticus hibernicus*) and the Outer Hebridean birds have been classed as racial forms by some authorities on the ground that the adult male is yellower in winter and shows more pronounced black wing bars, and that the Irish hen alone shows buff bars. The darker black form of grouse is commoner on the eastern and central rather than the western side of the zone of distribution. The buff-spotted and white-spotted variations appear to occur both in cocks and hens of all types.

When the bag is laid out after a drive in late September the onlooker cannot fail to be struck by the wide variation in plumage presented. The cocks are just changing into their winter and spring dress, and present all forms of variation from the summer-autumn plumage. The hens are already for the most part in their autumn-winter dress, but it is not until well into November that

the sexes have separated into their true types. The moults take different periods and occur at different times with the two sexes. In midwinter the sexes are perfectly distinct, at midsummer they are both typically black buff and indistinguishable. The hens begin their spring costume in March and adopt their autumn change of costume after sitting—that is to say, from July. The cock, on the other hand, does not drop his winter suit until the end of May, and only wears his summer clothes to the end of October.

The determination of the sex of grouse can only be arrived at with certainty by opening the bird, and it is not too easy to tell the age of birds once they are full grown. The general test is to try the strength of the lower section of the beak. If the jaw breaks or bends with the bird's weight it is a young bird. Before full growth is attained the third primary feather of the wing is shorter than the others, and the webs of the flight feathers narrower and more pointed than with old birds. Housekeepers should make note of this, for the difference is not recognised by many poulterers, and it is possible to buy perfectly good young birds for the price of old ones at many of the great stores.

The determining factor in the range of grouse is the heather, which is their main source of food. It is, however, vitally important that this should be the right kind of heather, which is the true ling (*Calluna vulgaris*), and not the ordinary cross-leaved heather (*Erica tetralix*) or the bell heather (*Erica cinerea*).

Grouse have been acclimatised with success in places where the food and environment were suitable. They have done fairly well in Sweden and in part of North Germany, and are reported to be making headway in New Zealand. They have proved that they can do well on Exmoor, and during the war years they certainly increased there, but poaching and rabbit trapping have once again seriously reduced the stock. On the other hand, although they have been tried in suitable heather areas in East Anglia, they have never prospered and have always died out.

If we review the conditions under which they thrive, it seems fairly clear that though heather is the main food, they also flourish on Irish moors where there is no heather to speak of, and we find that they do well on a variety of other food plants such as the whortleberry, or blaeberry, and crowberry. The main essential of the environment appears not to be so much the proper food plant as a suitable condition of acidity of soil and water. Peat bogs and waters

are mildly acid, and from researches on game during the last few years I have reason to believe that a slight bias toward the acid side of neutrality is a very important factor, not only in the nutritional metabolism of certain birds, but in limiting the ravages of disease. The second important factor is available sources of white quartz grit. Quartz appears to be absolutely indispensable to the gizzard of a grouse, and flint or granite, which serve well for other birds, appear to be inadequate for the purpose.

On Exmoor we find true heather, suitable quartz, and a predominantly acid environment; in East Anglia we have heather, but it is very largely on sand overlying chalk, and the surface soil is not sufficiently acid, and there is no rock quartz grit. Where a question of the acclimatisation or introduction of grouse is being considered, these ecological factors may well be of vital importance, for we might find that the bird could tolerate a new range of food plants provided that the other environmental factors were similar to those on its natural range.

Grouse are on the whole hardy birds, standing both the extreme cold and snow of the northern winter and the heat of summer well. They pair early in the year according to the mildness of the winter, but are usually in full courtship by March, and begin to lay about the middle of April. An early or a late winter exercises a considerable effect, and in a late season shooting may have to be deferred to ten days or a fortnight after the opening Twelfth of August, as the young birds are not in full feather. The average clutch of eggs seldom exceeds eight, and sitting begins in May, though hens will go down on early nests in late April. Incubation takes from twenty to twenty-four days. The great danger during an early nesting season is from late snowstorms and frosts, and rains during the hatching. The hen sits as a rule well in spite of these conditions, but eggs may get frosted or covered by snowdrift when she steals her nest for food and disaster follows heavy rain at the time of the hatch.

The main source of food for the birds is heather, and the chances of the season largely depend on the available supply. To this end the estate owner aims at providing for each year a suitable rotation of heather of the proper stage of growth. Heather control is the real secret of moor management, and proper draining and burning are in turn the secrets of heather control. In Scotland and Yorkshire heather is a plant of slow growth, although in Corsica

and the sunny lands of the Mediterranean heather will grow to the size of trees in a few years. With us it takes on the average six years to reach the stage at which it represents food for grouse, and in another seven years—that is to say, when the growth is fifteen years old—it is too tall and too woody, and useless as a food supply for the birds.

While it is quite easy to prescribe draining and heather burning as a specific for moors, it is not by any means so easy to carry this out. Moors vary enormously, but in the main they represent a very thin deposit of peat and decayed vegetable matter over a mountain of jagged bed rock. The valley basins and cusps become bogs, and hold water except for the natural drainage of the burns. As the deposit of vegetable matter rises, an undrained bog surface tends to rise and the area of bog extends, gradually encroaching on the drier heather zone.

Occasionally a big peat moss area may itself be drainable and reclaimable, but as a rule it is more important to drain high depressions and plateaus which are not bog but boggy into available low-level bogs or flows or into large burns. The system usually employed is to dig a series of shallow zigzag or herring-bone ditches or grips by hand. This involves a great deal of labour, but it is the only method so far applicable, although there is hope that some kind of light caterpillar tractor may be evolved which will pull some kind of a tool or mole plough which will cut suitable trenches. At present, so far as I know, nothing of the sort exists, and the problem of finding a tractor to move over soft surface, and a tool which will not smash on meeting unexpected solid rock, may tax the ingenuity of inventors, but should not present insoluble difficulties if it were seriously tackled.

The problems of burning are even more difficult, for it is almost impossible to conceive anything more hopelessly uninflammable than a waterlogged moor in a wet spring. The areas involved are enormous, and the task of burning off thousands of acres is a stupendous one, for not only must the old heather be dry enough to burn, but it must be burnt when the wind is in the right direction, and it must only be burnt during the legal time of year for heather burning—that is, from November 1 to April 10.

In practice heather can seldom be burnt satisfactorily before late February and March, and it is seldom that there are more than ten to a dozen days when

conditions are right. The theoretical standard of perfection is to burn a fifteenth of the whole moor area annually so as to insure a regular system of rotation, but actually most moors are so far behind that no regular system works, and there is, according to theory, far too much old heather and far too little young heather than there ought to be. Against this doctrine, on the other hand, we have the opinion of many observers that old heather has its special virtues. It is admittedly excellent holding cover for the birds, but they contend that once winter sets in and heavy snowfalls come, the inside shoots of knobs and patches of old-growth heather is the only available suitable feed for hard-pressed birds. In support of their theory they will instance moors where old heather predominates and there is a full hardy stock and no disease, and others where heather was heavily burnt off during the war and conditions are notoriously poor.

Another argument advanced against undue burning is that it increases the area of grass at the expense of the heather. This is perhaps more apparent than real, for the first few years after a big area has been cleared certainly shows a heavy growth of grass, and one may have to look carefully to see the young-growth heather sprouting up under cover of this growth of bents. If, however, the weather of these early years is favourable the heather gets a good start and flourishes. Heavy frosts or wet and sunless years, on the other hand, cut back the growth, and the burning is wrongly blamed for the failure.

Heather is subject to a disease which for long was looked on as the effect of frost, but is really the effect of a beetle, *Lochmæa suturalis*. Where you see patches of withered rusty grey heather, many keepers still hold that this is " frosted " heather, but it is nevertheless the evil work of the heather beetle. The life-history of this insect has only comparatively recently been worked out, and it is found that while the insect only lives on the food plant during the summer, its pupal stage is passed fairly deep in the ground round the roots of the heather. Spring burning, which only affects the top growth and penetrates but little into the ground, does not therefore touch the pupæ, and the disease spreads, The solution is burning during the summer when the insect is above ground feeding on the affected plants; but this introduces three difficulties: first, it means disturbance of the moor; secondly, it is difficult to burn heather once the sap is up except in very dry weather; and thirdly, it is illegal. Doubtless legal measures to deal with the pest will be introduced, but at the moment it presents

an increasingly difficult problem to the managers of moors where it has gained a serious hold.

There is, as we can see, a great deal to be done on a moor. It is less easily appreciated that apart from the keepers and the shepherds labour is scarce, and there is a good deal to be said for the usual practice, which is to pay no attention to the gratuitous advice of the expert and go ahead, "leaving the birds to themselves and centring on good keepering."

If we consider the Scotch moor of sixty years ago we must imagine a picture very materially different from those moors today. Vermin abounded, and the proportion of grouse to the thousand acres was not a tenth of the present number. Heather was irregularly burnt where sheep grazing prevailed, and left tall under the mistaken idea that it was best for the birds where shooting rather than sheep was the paying factor. The total neglect of heather burning in the belief that tall heather was best for the birds led to a grouse famine in the early seventies. The vermin maintained a very different balance of nature than we enjoy today, and hawks, wild cats, foxes, stoats, and corbie crows took a very heavy toll. In half a century we have reduced vermin attack enormously, but it is always a latent factor, and the short spell of four war years showed an enormous increase in vermin, which it has taken seven years to reduce to pre-war normal.

In Sweden very much the same system of intensive vermin suppression was followed by an enormous increase in the head of ryper (*Lagopus lagopus*), the willow grouse of Scandinavia; and in pre-war years Scandinavian shootings, although vastly inferior to Scotch sport, represented a rising market and attracted many sportsmen. The peak increase was the year 1911, since which the decline in stock has been so serious that the surviving stock is but a shadow of its former self, and the value of the shootings negligible.

For some years a very careful biological and ecological study of the Scandinavian grouse disease problem has been carried out by competent authorities. Their findings throw considerable doubt on the conclusion arrived at by our Grouse Commission, which attributed our grouse disease losses so very largely to strongylosis. The Scandinavian disease is clearly and solely coccidiosis, and strongyle is absent in the ryper.

More important than this is Dr. August Brinkmann's conclusion that the

3 mass of black & white feathers

Black Game at Glen Tromie.

spread of coccidiosis is very largely due to the overreduction of vermin and birds of prey. Intensive keepering and a system of rewards reduced the vermin stock enormously, but this interference with the balance of nature brought unsuspected disasters in its train. Seasonal fluctuation from disease was noticeable before, but its periodicity was short and its effects not very serious. Since vermin were reduced the disease has become paramount, the infection endures from year to year, and a steady decline is noticeable. The cause, according to Brinkmann, is the killing off of the vermin, who in their natural state preyed on and killed off weakly birds, and, to use his expression, " performed the functions of a sanitary police."

The theory is interesting and attractive and probably correct, but I should like to see it carried a little further. Avian coccidiosis is not transmissible to mammals, but it remains to be proved (and it is easily susceptible of experimental proof) whether predatory birds are themselves resistant to coccidiosis.

The report of our own Grouse Disease Inquiry Committee was the result of a similar intensive study of grouse over a number of years from 1904 to 1911, and it surveyed all aspects of the grouse in " Heather and Disease," and published its report under this admirable title.

The whole formidable host of internal and external parasites were passed in review, and the blame for grouse disease was allocated to two separate sources. Firstly, coccidiosis; secondly, strongylosis. Taking coccidiosis first, we have a parasitic infection which is transmitted through the droppings of diseased birds. Anyone who has walked a moor must recognise the very heavy fouling which is so plainly obvious where big stocks of birds are carried. The encysted coccidia pass out of the diseased birds in uncountable myriads. After a short exposure they become infective, and are ready to transmit the disease to any bird picking them up. The overcrowding of stock in an area enormously increases the chances of infection, and as mature and apparently healthy birds carry the disease all the year round, the spring outbreak of disease after a bumper year is almost inevitable. There is reason to suppose that some distributing agent—fly or other insect—is a contributory factor, for birds are as a rule cleanly, and will not pick fouled heather.

Strongylosis is due to microscopic round worms discovered in grouse by Cobbold in 1873, and known as *Trichostrongylus pergracilis*. They lead to

a chronic inflammation of the blind gut, and in the case of a heavy infestation may penetrate the wall of the gut, allowing the bacteria normally present in the gut to reach the body cavity. They lay enormous quantities of eggs, which develop rapidly, and passing out with the droppings lie on the surface of the moor. Here the egg or encysted larva hatches and wriggles out as a minute invisible worm. It can live for a long time in a moist environment, and is a quick mover. It wriggles up the stems of the heather and comes to rest in the drop of moisture on the tips of the young shoot, which is the natural food of the grouse.

To quote a lecture delivered by the late Sir Arthur Shipley in 1911: "It is difficult for the layman to grasp what is going on in and on the soil and on the plants which it supports. Suppose we could by means of a gigantic lens magnify a square yard of a grouse moor one hundred times. The heather plants would be as large as lofty elms, their flowers as big as cabbages; the grouse would be six or seven times the size of 'Chantecler' at the Porte St. Martin.

"Creeping and wriggling up the stem and over the leaves, and gradually but surely making their way up toward the flowers, would be seen hundreds and thousands of silvery-white worms about the size of young earthworms. Lying on the leaves and on the plant generally would be seen thousands of spherical bodies the size of grains of wheat, the cysts of the coccidian, and on the ground and on the plants as large as split-pease would be seen the tapeworm eggs patiently awaiting the advent of their second host. It is perhaps a picture which will not appeal to all, but it represents what unseen and unsuspected is always going on on a grouse moor."

Eighteen years have passed since the committee published its report, and since then opinions on the effect of strongyle infestation have been tending to change. Coccidiosis is now deemed to be the really important lethal factor, and it should be noted that strongylosis is unknown in the Swedish willow grouse, which feeds largely on tree buds and mainly on food other than heather. Strongylosis is seldom found unassociated with coccidiosis, and there is ground for belief that this nematode infestation is in some way stimulated by the presence of coccidia and the consequent unhealthy condition of the gut. We find very similar conditions in other game birds where a parasitic worm population

is normally carried. Worm infection is seldom serious enough to have any pathological importance except where coccidiosis is found in association with it.

Both coccidiosis and strongylosis are more dangerous to young birds than to adults, but after a severe winter the spring outbreak on a crowded moor often wipes out a heavy proportion of the stock of old birds. This spring infection is undoubtedly coccidiosis, which may or may not be accompanied by strongylosis. The later outbreaks which are noticed in August will as a rule show a higher concentration of strongyles than the spring count, but there is little doubt that grouse disease as a whole is a mixed infection, with coccidiosis as far the most important lethal factor.

The question of overcrowding introduces two generally recognised factors: firstly, shortage of food; secondly, increased liability to infection. A third factor is probably at work as well. The normal healthy bird in perfect condition probably carries a small residential population of both strongyles and coccidia. I have invariably found them in slight degree in such birds as have been accidentally killed in winter. We do not know what element in grouse health it is which keeps the infection within harmless bounds in the individual. The balance of probability suggests that some element in the diet maintains a natural condition inhibiting the undue increase of the parasites, and that this factor is an acidity element which apparently declines in spring, recrudesces in summer, and again apparently declines in early autumn. In a wholly good year culminating in a general bumper season it is obvious that we are dealing with a combination of favourable circumstances of which abundance of the unknown factor X is one. Whether X is a simple chemical factor in food or an accessory food factor, such as vitamin source appearing early in the season in the natural food in good years and lacking in bad seasons, are possibilities yet to be explored, but it is abundantly clear that the last word has not been said on grouse disease. A great deal yet remains to be done before we can really claim that we have ascertained the exact conditions of feed and environment we should endeavour to produce on a moor in order to afford the birds the best chance to cure themselves in their own natural way.

In addition to the loose seven to eight year cycle of grouse abundance and famine there are occasional periods when for some unknown reason grouse appear to desert a specific range of moors and migrate to others. It is not a

true migration, but a local movement, and so far the phenomenon is not understood, and attempts to trace any seasonal movement by ringing birds have all proved non-conclusive. Keepers will tell you that birds simply "come in," and goodness knows where they come from or why. Neither weather nor obvious food shortage account for the movement, but it is recognised that where disease occurs on a moor birds tend to leave it for neighbouring moors. They are in search of something, possibly without a clear conception of what they need, but certainly conscious of some form of shortage—something, possibly the X factor missing in their environment.

There was heavy movement in 1913, and to a certain extent in last year, 1928, when a wet and sunless year made a generally poor season with a high disease figure. The apparently aimless and inexplicable movements of grouse may not be simply a natural repopulation of disease decimated areas by pressure of over-population from well-stocked areas, but instinctive migration in search of some undetermined factor as difficult to explain as the fondness of deer for a salt lick, but necessary to the sense of well-being and the maintained health of the grouse.

Though the grouse is the dominant bird of its kind, there are three of its cousins with which the sportsman will do well to become acquainted. These are in order of importance the blackcock, the capercailzie, and the ptarmigan. Their occurrence on a shoot is a matter both of regional distribution and suitable local environment, but in general you will only find black game where the moors and foot-hills break down into a girdle of birch woods and sparse coverts adjoining agricultural ground. The capercailzie is definitely a pine wood bird and the ptarmigan is only found on the tops of the mountains. It is fairly easy to find places where you will get two out of the three, but to get all three on the same ground involves a very much wider or, to be precise, taller range of environment.

The blackcock used to be known as *Tetrao tetrix*, but has recently been changed to *Lyurus tetrix*. In general it is called by ornithologists the black grouse to distinguish it from the red grouse, but sportsmen speak of blackcock and term the female grey hen. Sometimes they are called heath-cocks or heath-fowl, as distinct from the red grouse which are called moorfowl, but these names are obsolete except in parts of Yorkshire and Northumbria. The bird has a very wide range on the Continent and in Scandinavia, and is familiar as the birkhan.

It is easiest, if not perhaps quite orthodox, to look on the blackcock as a bird like the grouse but larger, living in the suburban fringe between moor and farmland, and living on a diet of tree buds, mainly birch, sometimes pine, and bilberries, crowberries, rowan, and corn. In the early autumn you will find black game on the recently harvested sheaves, and the desk-trained forester with singularly little reason regards them as possibly hostile to his plantations. Actually the economic misdeeds of the blackcock are not widespread, and to the credit side of his account stands the fact that unlike the grouse he feeds heavily on the objectionable heather beetle. On occasion, such as when most food is covered with snowfall, small plantations may be seriously attacked, but it is a result of necessity rather than a natural wanton habit.

The breeding habits of the black game are still obscure, for in spite of the affairs being carried on with the utmost publicity, naturalists are not yet agreed whether the birds are both polygamous and polyandrous, or whether a successful cock is a permanent attraction to his hens. Everyone is agreed that the cock is polygamous, but the true attitude of the females has yet to be defined.

It is the habit of the birds to establish a sort of night club, or rather dawn club, which we call a "lek." This is usually a woodland clearing with a convenient mound or tussock or even a fallen tree trunk, on which the males can display before the hens, who occupy the surrounding lower ground. More open sites are often selected and the lek ground may be on a moss or an open rough field. Despite the isolation and secrecy of the lek the noise of the club can be heard for a long distance. The old cocks take station and call, and battle, or at least moderately serious battle, takes place between the challenger or promoter and the other cocks who come to the club. Victory is rewarded by possession of the hens, who apparently choose the victor or on occasion comfort the vanquished.

The lek business begins in October as a half-hearted form of rehearsal, but is not in full swing till early spring, and ceases with the nesting. The decrease in black game is believed to be in no small part due to the tyranny of the old blackcocks, who will not allow the younger birds access to the ladies. The courtship of the younger generation is subject to frequent interruption, and it is generally recognised that in order to increase black game stock the more old cocks shot down the better.

The preservation of grey hens is a matter of some difficulty, for being smaller

than the cock they closely resemble a rather large grouse. The novice—and indeed on mournful occasion more experienced shots—frequently lays low a grey hen and only realises the enormity of the offence when he sees from the eloquently averted countenance and dejected back view of the keeper that this dreadful happening has come to pass. Setting begins in May, and a clutch varies from six to ten eggs, and the hatch after a period of twenty-four to twenty-six days occurs in June. The period of growth and full feathering is relatively long, and the young birds are not ready or fit to be shot before late September, despite the fact that the legal opening date for black game is August 20 in Scotland and September 1 in England. The sexes of mature birds are easily distinguished by the difference in size and plumage, but with young birds the male plumage only begins to make its appearance in October.

Black game were once more plentiful in England, but they only exist now apart from the Border in parts of Wales and on the moors of Devon, Cornwall, and Somerset. They were at one time found in the New Forest and in Shropshire, but are so far as is known now extinct. Many attempts have been made to acclimatise them in apparently suitable areas, notably in East Anglia, but these have always failed. In their natural environment there is usually a plentiful supply of moisture, and it would appear that the conditions which affect grouse also operate in the case of black game.

Capercailzie are the largest of the grouse tribe and they are essentially birds of the woodland. *Tetrao urogallus* was indigenous to Great Britain, but became extinct about 1760, and was reintroduced between 1828 and 1838 by birds brought from Scandinavia and put down by the Marquis of Breadalbane in Perthshire. The introduction was successful, and they have now spread over a very wide range of Scotch counties and appear to be extending wherever adequate pine woods furnish a suitable environment.

The capercailzie is a formidable-looking bird almost as large as a turkey and equipped with a fine hooked beak for shearing off pine tips. Its edibility is a doubtful quantity, as its food gives it a predominant flavour of turpentine, but a young capercailzie is, if properly cooked, eatable if not attractive. Although known to the Germans as the "auerhahn," and to the French as "coq de bruyère," a fine specimen was identified by the chef of one of London's best restaurants as "espèce d'aigle marin—on ne mange pas ça"—and nothing

would shake his opinion. His ornithology may have been doubtful, but his instinct was on the whole fairly sound. They are seldom worth eating.

The matrimonial affairs of the capercailzie are conducted rather similarly to those of the blackcock, but in place of holding a joint competitive affair at a lek the birds call from trees fairly close to one another, a proceeding known as "spelling." Invasion of the territory of one cock by another leads to conflict, but in general it is a competitive choral festival rather than a buffeting match, though on occasion serious injuries are inflicted. In the opinion of most observers the hens select the males, but whether they are faithful to a single selection or generally promiscuous is not known. Judging by the relative frequency of crosses between blackcocks and capercailzie hens the latter are not too puritanical.

The outstanding thing about the capercailzie is that, though he is a big heavy bird with a formidable wing spread, he is uncannily silent. His rise from a fir tree is not the explosion of a covey of grouse or the racket made by an old blackcock, but a silent affair. It is I think wrong to speak of it as a rise, it is more of a swift silent glide, and capercailzie moving among the cathedral aisles of old pine seem to take very full advantage of natural cover between them and the gun. If they rise from the ground the noise is considerable, as they have to flap heavily to rise to speed. They afford good sport for an occasional drive, and require stopping with large shot. They also afford excellent light rifle practice for a skilled stalker. On the Continent they are like the blackcock stalked and shot while displaying or calling. This seems to be rather an unsporting proceeding, but Continental sportsmen have assured me that it represents their only chance of getting near the birds at all.

The natural range of the capercailzie in Northern Europe is a fairly wide one, but attempts to rear them by hand in captivity have proved only fairly successful. They seem to be very suitable for acclimatisation in typical fir forest country, but results do not always follow. The reason seems to be that the hen bird nests as a rule on the ground, and though she lays a clutch of ten or twelve eggs, she is a markedly incompetent and careless mother, and infant mortality is unduly high.

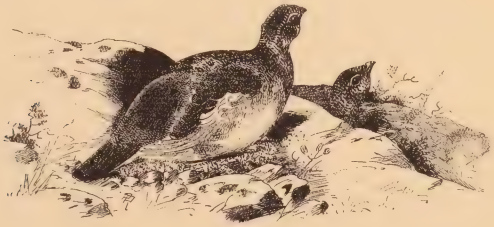
The ptarmigan, *Lagopus mutus cinereus*, is wholly a bird of the mountain tops and is seldom found below the two thousand five hundred foot level. Related

local forms are found in Northern Europe, but the conventional ptarmigan of the poulterers' shops is more often a willow grouse or ryper in its white winter dress than the true ptarmigan. The true male ptarmigan in full winter plumage can be recognised from the ryper by its black lores and eye stripes.

The change of plumage from the mottled grey brown summer wear to the white of winter is obviously in order to harmonise with the snow. If snow does not fall the birds are painfully conspicuous and they know it, for if scant snow is available in drifts or fields they will concentrate on these rather than on the dark rock fields.

The altitude at which the birds live and the fact that the complete assumption of winter plumage seldom occurs before winter is in, and the grouse shooters gone, means that in practice few winter ptarmigan are shot. They will, however, provide a variation of the ordinary day's sport any time after September; but the sport is variable, for on occasion, usually in quiet weather, they will sit with undue placidity, while in boisterous weather you may not be able to get near them. In general one only meets them when deer-stalking on the high tops, and then one regards them as a confounded nuisance as they may put down your stag.

The food of the ptarmigan is predominantly blaeberries and mountain plants, but heather is eaten on occasion. They are apparently subject to "grouse disease," but whether this is coccidiosis pure and simple or strongylosis does not appear to have been definitely ascertained. The Norwegian authorities have, however, not been able to substantiate any case of strongylosis in willow grouse, and note that when "disease" appears it is coccidiosis, and attacks willow grouse, ptarmigan, black game, and capercailzie alike.



VII
GROUSE

Arnold Spager

Loch Ard, from a Glade above Loch An Shalcaig

Grouse at Forest of Gaick above Loch an Sielacht.

Chapter VII

GROUSE

GROUSE shooting is a very purely specialised affair and it introduces special elements found nowhere else in the world. Considered from a strictly shooting point of view it is doubtful if grouse driving does really represent the best of sport, but taken from the general pleasure point of view it is admittedly the finest thing of its kind, not only in the kingdom but in the world in general.

Grouse shooting automatically suggests Scotland and, indeed, depends on Scotland for its popularity. There are moors in Yorkshire where record bags are made, but they are in the hands of noble families, and the lesser moors are in the pockets of successful North Country factory owners. There are a few fair moors in Derbyshire and in Wales, but in general it is not until we get north of the Border that we find grouse moors reasonably reliable in supply and available from prices only within the tolerance of millionaires down to those small affairs which a modest sportsman may on occasion afford.

You may enjoy a quiet perusal of the Scottish Register and select a season on an estate where the season's rent runs somewhere between fifteen hundred and two thousand pounds, or you may, at the end other of the scale, content yourself with a modest and extremely remote mixed shooting, without a house, where you may pick up fifty brace of grouse and a lot of odd stuff on a couple of thousand wild acres.

In general, it is fairly safe to reckon that your general outlay, if you take a house and a moor, will be very little less than exactly twice the rent. If you take a low-priced small moor without a house and stay at an hotel, or get local accommodation, the figure will probably come to a good deal more than twice the rent. Scotland is not cheap, but at least it gives good value for money. Grouse shooting opens on August 12, while in England partridges will not open till September, and you can reckon on an extra twenty days of early holiday.

It is a complete change of scene and environment, and it is one of the finest possible health resorts; and the conditions of sport are such that even the laziest plutocrat is obliged to take at least a minimum amount of exercise in securing it.

Since the enterprise of the Cunard Company introduced Americans to the moors—or the moors to the Americans—a bitter wail has gone up that the price of moors will go even higher. It is hardly a new thing, for in a copy of *The Highland Sportsman* for 1883, we find the talented author of that curious publication, Mr. Robert Hall, predicting that the arrival of French tourists "will send the price of shootings up still higher than at present. Once let the French people acquire a taste for the 'red grouse' and your moderate-rent sportsman will find nowhere to place his foot, so far as the Highlands of Scotland are concerned, unless he is contented to share a moor with someone else." A comparison of the rents asked in those days and those asked now is also interesting. They have more than doubled in the forty years and the additional outgoings have also very much increased. Champagne was "all the noted brands from forty-two shillings a dozen upwards." Whisky was below four shillings a bottle, hotel accommodation was half a guinea, and out of more than a score of hotel advertisements not one of them mentions the game of golf as an attraction to intending visitors. It was, perhaps, an age of less speed, but so far as shooting is concerned birds were as plentiful, guns shot as hard and as far, though ammunition was far cheaper. Hammerless guns were established in favour, but the mention of ejectors is for later years. Grouse were mainly shot over dogs and driving was yet to come. Smokeless powder was in existence, and it was specifically recommended that it should not be rammed tight into a cartridge case; but in general shooting then was much as it is today, and perhaps one of the great values in grouse shooting today is that it gives us an unconscious step back through time to the pleasures of a less hurried age.

There are several ways of shooting grouse. You may walk them up, you may shoot over dogs, or you may drive. Of these methods driving is undoubtedly the most effective, dogging possibly the greater pleasure if you are sound in limb and, more important, wind. The economic factor reflects popular choice: driving moors fetch far higher rents than dogging moors, and even though one may admit the superior sporting appeal of shooting over dogs, it must be remembered that they have to be really good dogs.

I hold heretical opinions about dogs, but am always willing to be converted by experience. So far as personal observation goes, extremely expensive trained dogs are hired for the season and have to be under the personal supervision of their handler. For every brace of good dogs you get at least one brace, possibly more, of bad ones, and the expensive, perfectly bred but bad aristocrat drives one frantic by pointing at anything from a wind-moved myrtle to an hysterical heather linnet jumping from twig to twig in the heather. The dogs soon get tired and there is delay during the changing, and in the end you find yourself getting far better sport over a brace of keepers' nondescripts, which are first-class working dogs, and would not fetch two sovereigns at Aldridge's sales of gun dogs. Ritual is a splendid thing in its place, but one does at least expect a reliable working standard of normal efficiency. The estate dogs (not necessarily in the pedigree books) will probably work well, but the hired impresario, with as many field-trial and show-bench distinctions as the champion of a swimming club has medals, is likely to prove disappointing. Keepers may be trusted to give a sound opinion on the matter, for they dislike raising a fine stock of birds in order to have the promise of their labours messed up by incompetent canines. Few factors are so vital in making a good day as good dogs. A bad season of perfectly hopeless weather may disappoint you on a driving moor, but on a dogging moor neither ideal weather nor a first-class season can protect you from disaster if the dogs are not first-class—and they very seldom are.

The ideal solution is to take a moor which is mainly driving but with some outlying beats to be taken for small days over dogs. There are advantages in this plan, for the intensive development of the social side of the Scotch season means that some guests may only be on a given moor for a few days. Not even all big moors will stand serious shooting every day, and the combination of outlying dogging beats with the drives means that the party can be kept usefully occupied shooting without unduly upsetting the necessary rest periods between driving days. The temporary migrant can, therefore, be given some intensive sport and exercise even if his visit just happens to fall wrong for the head keeper's special dates.

However good a dogging moor—and the dogs—you will not get the big bags you get on a well-driven moor of equivalent acreage, but you may get better sport. It is purely a question of personal preference, and if you, like many of us,

get more pleasure out of seeing dogs work and hunting with them than you do out of the "wild minute" of a big drive you will be perfectly happy and contented; you will also walk farther for your sport and probably be too sleepy for either prolonged dancing or bridge later in the evening.

Dogs—that is to say, the star dogs—are either pointers or setters. The chorus dogs who so often carry the show through when the stars are temperamental, are anything with a nose and anything but a pedigree. I have shot grouse over a lean and shaggy nondescript bitch whose main task in life was sheep, but whose hobby was grouse. Fastidious or ultra-fashionable folk, to whom panoply is more important than results, might have been uneasy lest somebody should happen to see this—er—dreadful animal, but from a practical sportsman's point of view, I have never shot over a more intelligent and altogether charming animal. She lacked style, her appearance was deplorable, but she would gather her guns with a limpid eye as neatly as a hostess picks up her ladies, and she was unorthodox but entirely effective.

It is, I know, sadly bad form to praise mongrels, but in spite of show benches and field trials there is a large class of keepers' dogs some of whom show obvious signs of mixed—badly mixed—parentage, and there are others who are nameless in the dogs' Debrett, but obviously of high birth, with only perhaps a hardly perceptible dash of the groom of the back stairs, but they are tireless, practical, sound working dogs, and they are not by any means to be despised. In fact, it is counsel of perfection to have some of these understudies standing by to get on with the work when the professional dog handler and his blue-blooded actors are fuller of excuses than performance.

Nothing is more delightful to watch than a first-class couple of dogs at their best. The pointer is a smooth, dappled animal which grows ecstatically rigid from stem to stern at the scent of game, or gets the same thrill when another dog points. The setter, a rougher, gingerbred-coloured animal, is similarly affected, but lifting a tentative paw "sets" or crouches at the scent of game or when backing.

Of the two, there is no doubt that the setter is not only the more picturesque, but far hardier for work over heather. We know how tiring early days can be, but the dogs cover five or six times the ground we compass and do it bareshod. As a result, hired dogs fresh to the moor not infrequently knock up from sheer exhaustion, and foot soreness is, from the heather going, even more prevalent

even where dogs are supposed to have been trained into condition. Incidentally, when shooting over dogs it is as well to remember that if you or anyone else in the party are out of condition and tired—as well you may be—after the London season, shooting will suffer badly. A wise host and a tolerant head keeper condition their party with graduated days of shooting and get them into condition without undue fatigue or exhaustion. You get fit in no time in Scotland, but it is as well to avoid overdoing it at first or the staleness will defeat you in the best of the early days. Keepers may assume that you are as fit as they are. Disillusion them at once and take things easy.

Dogging is inevitably at the mercy of the wind, for the dogs can only get the scent of the birds as the wind carries it toward them. If you worked dead up wind, ranges would be too long, so you work the dogs with a crossing or quartering wind, moving to and fro across an area of moor. In hill country winds are chancy things, and though all the weathercocks on the grey baronial style Victorian castle may assure you that it is a westerly wind, up on the moors the hills will vary it, and you may find it blowing across one valley and down the next. These variations of air are known to the keeper and his day is planned accordingly. If you come to ground which has to be taken directly up or down wind, your leisured traverse ceases, the dogs are leashed, and you cross the ground to a more favourable beat.

The ideal dogging day is round a saucer-shaped bowl with old tall heather at the bottom. You work round the tops shooting and concentrating the unexpended ration of birds in the bottom of the basin for a fat ending to the day; in the afternoon advance through this cover. The art is to search the maximum area of heather with the guns and dogs available.

You work with your two dogs, one to range, the other to back, and the keeper to order them and a ghillie to carry. The forward dog quarters and searches from forty to sixty yards in front of you, and your success very largely depends on a quick interpretation of what the dog is doing. On a quiet day with a low steady breeze it all goes according to the book: the dog points or sets, you and your neighbouring gun on the other flank of the dog move rapidly and silently forward, the dog steals a step or two, and then the covey flushes. You pick your birds quickly and tumble them into the heather with a deadly and stylish right and left.

Actually it is not always like this: the wind may be blusterous and gusty, the dog young and not too steady, and the birds wholly unpredictable. In place of advancing silently and rapidly, you move noisily and with a pained sense of sheer breathless exhaustion. The covey, which should, theoretically, crouch till you get within decent range, either leg it like "blazes" and rise to vanish as a silent brown wisp well out of all possible range, or the dog has overrun them and they rise where you least expect them to one side of the line between you and the dog. Alternatively, every time the keeper or dog handler whistles to the dog to set, the birds rise splendidly but out of range.

If you observe a Scotchman who is a practised dogging shot you will notice that he really does as much sheer hunting as the dogs. He knows apparently what the birds are likely to do. A pause on the dog's part, a hesitant turning of the head, a momentary arrest of that eloquent stern, and your crack knows what is going on. He cuts in and gets his shots before you, a contemplative novice, have realised that game is about to be a-wing. The fact is that our native friend has a very complete knowledge of the game and realises that, wind being in such a quarter relative to the line and the lay of the ground, birds will probably do so and so. They will, he judges, infallibly breast the wind to rise and swing down wind. Consciously or subconsciously he is able to eliminate a good deal of non-material factors, but the novice is, until such time as he learns experience, unguided by any probabilities and expects birds to rise with the conventional gestures and at proper times and places.

On the whole the disappointments of dogging are not worse than those attendant on driving, although admittedly the publicity is a bit fiercer. There are, however, enormously compensating advantages. In the first place you have a continuous day rather than one broken up by long waits between drives. In the second you have all the enchantment of a mixed bag. There is the blue hare that gallops away from a rush tussock, the teal which rises totally unexpectedly from a water-filled peat hole, and the hysterical snipe which rises from nowhere and jinks defeatingly, then falls to your triumphant second barrel. Above all, dogging brings you into closer intimacy with the moor; you are always alert, for on speed largely depends your success. But watching the dogs you yet have time for other things, and skyscape and moorscape unfold in beauty as you walk.

Grouse driving is undeniably more popular than dogging. The bags are

larger, the rate of fire much quicker, and it is a rather more sociable form of shooting than dogging. Incidentally the social side is rather a factor to be considered. If a house and a moor are taken for the season, it is probable that the ladies will want to see something of their guests. They will come out to lunch on the moor and may perhaps see the first drive after lunch, though all keepers and most sportsmen are agreed that the less the grouse see of ladies in the butts the better the sport is likely to be. Compromise is essential, but any grouse moor is better for social amenities than a deer forest where the rifles depart early in the morning on their separate beats and return completely exhausted at dusk, too tired to be sociable.

There are other points besides the average bag which may well be taken into consideration when leasing a moor: its accessibility from the house, access by a road practicable by cars and, last, by its contours. All these factors reduce fatigue, and once middle age is reached the sportsman whose town life is by habit sedentary finds braes which the natives class as mild acclivities to be mountains of steepness. The host may acclimatise rapidly and be a good walker in his second week, but relays of not too adaptable guests may find it impossible to cope with his hills without undue fatigue—and a tired man does not shoot his best.

The young and vigorous may disdain the rough old shooting ponies, but they are more than a convenience to less Spartan types, and a host whose friends are no longer boys will earn their thanks if he sees to it that McTavish's old galloway saves Shank's mare.

Moors being rolling undulations of heather and peat mosses, there is no natural cover available, and as driven grouse will not fly within range of an exposed gunner, cover has to be improvised in the form of butts. These are for the most part breast-high constructions of turf; occasionally in stone country they are built of stone; and more rarely we have a line of sunk butts. These, if good, are very good, and often a line of sunk butts would very much improve an " over the skyline " stand. They need, however, to be fairly permanent stone-lined structures and, above all, well drained. The construction involves both thought and labour, but no amount of time and labour can be more usefully employed in moor management than seeing that the butts are as good as they can possibly be.

The ordinary butt faces to one front and is a straight or slightly arched

breastwork with slight wings. An average width is six to seven feet. The flooring of the butt is often abominable and consists of a few bundles of heather thrown into a sodden squelch of peat mud. Fir trimmings or rough planking make a good floor, but are liable to be used as firewood by the Scotch shepherd. There is no practicable remedy for this, but when a man is paying a good price for a moor he resents ill-kept butts, and the agent's economy of a pound or two may weigh over heavily in the psychological scale.

A good stance is essential to good shooting, and the novice to grouse driving, however good he may be at other birds, will find a certain element of restraint in that he is firing over a parapet and that the stance may be not such as he would select at any stand where a few feet of movement in any direction would put him on suitable ground. One hears owners grumbling that shooting was poor, and that the lessee and his friends did not reach their limit or shoot well enough and close enough. Good shooting pays the owner and the lessee. It is a joint interest good for both, but where a butt is good enough for the able and practical native, it may be the deuce of a handicap to a less skilled visitor—who is, nevertheless, a capable fellow on his own ground with other birds.

Butts are sited according to the needs of the particular ground, and the main essential is that they should not be visible for long distances from the direction in which the drive is taken. Butts appear to a stranger to be very conspicuous objects in moorland scenery, but actually they are less in evidence than they seem when viewed from a distance. From a butt you get a vista of a slope of heather and then skyline. They are sited, not on the crest of a slope, but slightly behind the rise so that birds do not see the butts. Occasionally we have to site butts in a downhill sweep like the bowl of a basin. Such a stand will give you perhaps the distant view of a hillside, but if you examine the immediate front you will find that there is almost invariably dead ground in the shape of a low valley or an undulation in the moor, which means that near birds rise out of sight and fly over the line of butts, and the first lots to come over who sweep down from the higher levels pass over the butts, which are to them hidden against background.

Experience will have disclosed that on certain ground driven in a specific direction, the tendency of the birds is to go over one particular sector. The butts have to be sited in this area, and provided that a skyline butt is always avoided and the points chosen are on either forward or reverse slopes of a hill and con-

cealed either against background or behind a rise a good result should be obtained. A new line of butts is always rather an experiment, and even after the most careful planning something obvious may be overlooked. A year or two ago I met one new line which had been plotted with the greatest care by owner, factor, keeper and all the best local wisdom. It was unsatisfactory, for as it turned out it faced the blinding dazzle of the setting September sun and shooting suffered abominably.

There are an infinite variety of butts, and each I think has its individuality. You may have one on a level or plateau where you can see birds coming from a distance, or you may be just over the brow of a hill where a pack appears to shoot up out of sheer nothingness and go over you in a flash, or you may be in one of those flanking butts which seem to hang like a swallow's nest below the vast hump of some great hill, and have birds coming at you both from the front and quartering. In any case they will give you scant time for reflection.

Both grouse and wind are variable things, so the curved lines of butts are usually planned to afford the best compromise. A steep hillside line may comprise a dozen or more butts at different angles and altitudes. As the season gets late and the birds stronger and wilder a different sector of this line will be used, and later on the gun in the lowest of the occupied butts may find birds passing him so high as to be actually out of range.

Nothing is wider than the differences in shots grouse will afford and nothing more noticeable than the way in which the shooting becomes more difficult as the season advances and the birds associate in large packs and get wild. The most typical of grouse shots is the dead-straight fast coming in bird which seems to be coming straight at your head. Partridges, for instance, fly far higher than grouse, and the latter coming against the wind simply skim heather-tops and only rise slightly to clear the butt. The result is that the novice is confronted with birds coming at speed and with a threatening demeanour straight at his head. At the next drive they may adopt other tactics. They may come surprisingly high, and in a body rather than in coveys. They may or may not come straight: they are just as likely to quarter the line. There seems to be no reason for this change of tactics, but the novice is not entirely right in putting it all down to the vagaries of the birds. Probably the second stand is different in its relation to the prevailing wind.

The experienced shot needs no advice, but the novice, meeting grouse for the first time, may actually pick up a tip or two from print. There are one or two main points to remember. First, this barren, blasted heath is stuffed with birds. There are vast numbers there although he cannot see them. This wealth of targets relieves him of responsibility. All he has to do is to shoot birds in front of his butt and not worry about anything passing him until he has had a week at the game.

It is splendidly easy to say take the birds in front: not easy until you get the knack of it. You will get the knack, but it may take a little time. To get off two straight barrels in front means that you must take your first bird *long before you think that he is within range*. Watch a novice, and you find him saving his fire till the birds are fifteen yards off. To him they look about thirty yards off. Actually he lets them get far too near.

He should shoot the moment a bird appears to him to be about the size of a house-fly seen over the foresight, and he should just snap to the shoulder and blaze just over their heads. If he is lucky in this interpretation of the prescription the birds will fly neatly into his discharge and be killed in first-rate style. The second bird must also be killed in front, but rather than shoot when they are too close, let them go by and take the next suitable bird in the intermittent procession at the right distance. Do not change guns. Turn round and try and kill them behind the butt until you have got the trick of hitting them in front. Spend the first days, dishearteningly if you like, mastering the approach shot. You will contribute more to the bag than you will by shooting back at picked birds. When a sense of personal inferiority seizes you, reflect that not every shot kills grouse; walk down the butts later with an eye to empty cartridge cases. Divide the total of these by the bag and you will find you are not alone in more fireworks than feathers. If you are nervy you can sometimes bribe a taciturn ghillie to time for you. Pace fifty yards from your butt and tell him to give you a "Now!" as the birds reach that point. He may be a bit slow, but jump to his "Noo!" till you have got into timing. Take it as shooting-school practice. Make it a rule to take them in front before you attempt to turn round and get long shots back with your second gun. In fact, long shots at grouse are neither good style nor good practice until you are well out of the novice class.

After each drive comes the pick up. This is far too often a matter for bitter

heartburning and it is entirely preposterous. If you have got a dozen down and one of your neighbours picks up two of yours rapidly and adds them to his pile, it does not matter. Some people will always do this kind of thing; others would steal the coppers off the eyes of a corpse—but why waste energy and temper and spoil your shooting? They do not deceive the loaders or anybody. Wink at your host and let it pass. Never waste time about a very doubtful bird down. If you are a novice you were probably busy enough shooting not to waste time marking. Your man does that for you, and even if you think that you have two long birds down behind, leave it to the keepers and the dogs. That under-keeper and the two dogs he held were out on the flank, and you can pretty well depend on it that he saw with an expert eye all that mattered. Shooting is a sport, not a lawn tennis competition.

The novice is usually secretly far more oppressed by the fear of doing something wrong than his real job of concentrating on getting the hang of doing things right. It is far better to let fifty birds go by than take any chances. "Safety first" is a good motto. *Never* take a risky shot down the line. Never fire after you see a warning flag of the advancing beater line, and never worry if other people who know more about the game take last birds while you let them go by. No host in the kingdom ever worried about an overcautious guest, even if the party chaff occasionally. At worst it is no fault, but a dangerous gun is a very real source of anxiety. Emulation is a very fine thing: competition may be a very nasty one; and it is very much better for the novice to err on the safe side and be overcareful than it is for him to let his excitement carry him away. Take things easy, conserve energy, for you will need all your reserves before the day is out; and do not worry about your shooting performance until you have got "the hang of the game."

The flow of birds may on occasion be perfect: they will come in a pleasantly broken stream, and you will be "on" your day. It will, I think, be the second drive of the third day, when wind is beginning to recover and you are beginning to get the true heather step—that high lift of the foot which we forget on pavements and in cars. The breeze on the moor will be no more than breeze, the air sheer wine, and a scud of clouds across the blue means no blaze and no rain. The butt is dry and there is good standing. The parapet is not too high, and the back wall not too close up. The first covey comes soon, a scurry of black dots

lifting to a swerve which brings them yours rather than your neighbour's. Two down in front, the second almost in the butts, and the third among the moss-hags behind—then steady work till your barrels sear your fingers, and the warning flags come on top of you before the thrill dies down. A steady run without a check.

Then there are bad butts on poor days gloriously reclaimed, when a covey comes swinging in from nowhere on the flank and comes rattling down high over the line, or unexpected blackcock come over like unexpected tumbrils from among the grey boulders and bracken, to pitch far behind and so far over the side of the hill that they seem to you to have carried on to drop plummet sheer into the blue loch hundreds of feet below. There is nothing to equal grouse for variety, for sheer exhilaration, for complete disappointment, and all the odd hazards that make up the joy of sport.

The novice has also secret worries about equipment. The first thing to remember is that visibility must be reduced as far as possible. No light showerproof, no white collar—moors are peat-brown russet in colour and brown or dark green stone grey; the colour we call Lovat alone harmonises with backgrounds. Early in the season moors may be hot, later cold and wet with driving wind and rain. Tweed will serve both cases, but moors are wet underfoot whatever the weather. Stout easy shoes and canvas spats will do as well as most things, but the shoes must be nailed, and though spats will keep shed water from the heather and irritating bits of heather out of the shoes, if you go into bog water you fill your shoes. Ordinary waterproof shooting boots and a canvas anklet are rather more waterproof but heavier for a long day. Most important is a staff, not necessarily the tall spying shepherd's crook of the deer-stalker, but an ash or hazel stick at least six inches taller than the usual town walking-stick. It sinks in the soft turf, but is invaluable to the newcomer to the hills. Stockings need to be thick soft wool; and foot comfort is all-important, for on a heavy day you will cover many miles. Above all, avoid excess weight as far as possible, but remember you will have long motionless waits when the mountain wind cuts chill and the high moors are grey and overcast. Dress on the whole for cold weather, and you will be safe even if it is blazing hot; but if you go lightly clad the odds are the day will change, and if you are not acclimatised and hardy both your shooting and your health may suffer.

VIII
SNIPE AND WOODCOCK

Swipe "Dismiss" in this Space.

Snipe "Drumming" in the Spring.

Chapter VIII

SNIPE AND WOODCOCK

SNIPE shooting is difficult and is pursued under rather different conditions to ordinary shooting. Where the latter is concerned, you are at least certain of seeing something even if you do not hit it; but snipe are here today and gone tomorrow, and, apart from places on the west coast of Scotland and Irish bogs, you can never be quite sure of your snipe being there to be shot. So far as England is concerned we get occasional snipe into the various column, for nearly any marshy patch may hold snipe; but you have to go far afield for a regular two days' solid snipe or cock shooting.

The unreliability of the snipe is only equalled by the unreliability of one's shooting. They are admittedly difficult, but this is mainly because, in the ordinary way of shooting, one does not get enough of them to be in permanent practice. A man with plenty of opportunity soon masters snipe and becomes recognised as a good snipe-shot, but you can bring many expert snipe-shots from the wilds of their Hibernian mountains, and, setting them to shoot other quarry such as the driven partridge or the high pheasant, find their reputations decay as you watch them. It is on the whole a matter of knack, and once you master the trick of it, snipe represent a very satisfactory form of sport, though very much inferior to other classes of shooting. There are enthusiasts who would deny this, but, practically considered, snipe shooting involves a disproportionate amount of energy in terms of bag, and once the necessary knack has been attained the sport loses interest, unless, as is the case with most snipe-shots, it is all they have got to shoot at. The odd and occasional day after snipe is excellent, and often a corrective to vanity, but the perpetual snipe-shoot, the endless walking up and the very occasional extemporised drive, cannot be accounted worth a great deal if one can get anything better. Snipe are de-

cidedly sporting, but they are the " Austin Sevens " of the game world, and three thousand acres of Irish bog and mountain will hardly yield the sportsman of restricted means the sport he will get on three hundred acres of decent English rough shooting, though he will get more exercise.

Woodcock, on the other hand, are worth while, and there are Irish estates where the late autumn cock drive parallels a good day on a pheasant shoot. But in dealing with snipe or woodcock it should always be remembered that, though a certain number breed with us, the vast bulk is a purely migratory influx, and that you can never be certain that the year will turn out to be good for either. If the year and the weather are both favourable, you may make good bags and have a good time ; but, in general, shooting in Ireland is a poor affair. The good shoots do not come on the market, and those which are offered are, with few exceptions, mug-traps of the worst description. Irish hunting is good—really good, though not as good as when the garrison was there—but the shooting is frankly paltry. The snipe is, on the whole, dearer to me for his spring display and his occasional provision of a perfectly satisfying, difficult shot (which you know inside you is a delightful fluke but which you modestly attribute to sheer skill), than he is for any particular shooting virtue. Get accustomed to his ways and he is not a wildly difficult quarry ; but meeting him in the ordinary way of casual shooting and blazing at him with the ordinary game charge of No. 6 or No. 5 pellets has enhanced his reputation as a difficult bird rather more than facts warrant. If you go out to get snipe with a gun with a close pattern and a proper charge of small snipe-shot, once you get over the early disconcerting stages of his rolling zigzag rise and the propaganda about his elusiveness, an average bag falls to an average shot.

Snipe are snipe all over the world, and their habits vary but little. In Great Britain we have normally only the two species : the common snipe (*Gallinago cælestis*) and the little Jack-snipe (*Gallinago gallinula*). In America the snipe is almost the same as our common bird, and in various parts of the world we have pintail and painted snipe, which afford excellent sport and behave very like our own home birds. There is a third variety which is an occasional visitor to us, the Great Snipe (*Gallinago major*), which is occasionally shot, but one can pass a lifetime without seeing one. It is a larger, far heavier bird than the common snipe, but the best indication is that it has sixteen or eighteen tail feathers in

place of the fourteen tail feathers of the ordinary bird. These vary considerably in size, and a big one is often mistaken for a Great Snipe.

In the past we had a special dark-coloured snipe known as Sabine's Snipe, and a light tawny one known as a Faroe Snipe, but the dark variety is now recognised as simply a colour variation, and the Faroe brand is not generally accepted.

The unreliable nature of snipe shooting is easily realised when we recognise that he is a bird whose whole food supply is dependent on worms, snails, and various small creatures which live in ooze and mud. The long sensitive bill is essentially an instrument of feel, and the snipe plunging it into mud senses the vibration of some unseen food animal, presumably by vibrations in the mud. If we have frosts and the muds are frozen, the snipe go to warmer regions where food sources are still open. This accounts for the rapid disappearance of the birds, but it does not account for their going, in some cases, two days before the frost sets in, and so far we have no reasonable explanation of how birds foretell weather.

The precise way in which a snipe eats its food has not been determined, although tame snipe have been kept in captivity, and one can often see them feeding at dawn or sunset on the mud. The old idea was that they lived by suction—presumably straining some form of tenuous nourishment from the ooze—like some ducks. Actually food is more substantial, mainly worms, but how they are swallowed is a mystery. You can see a snipe stick his beak almost fully down into the mud with a slightly slanting dab, pause for a second or so, then drive it full home, and then withdraw it and move on for another plunge. Sometimes he draws blank and comes out quickly; at other times he will stand with his beak in the mud at one spot for an appreciable time. It is, I think, when we find a bird in this attitude that we get the origin of the idea that a snipe uses his beak to give himself a kick off from the ground when he rises.

Presumably he sees some surface indication of food below, some slight depression or mark where the worm has withdrawn. He spears in, senses the movement of the disturbed worm, opens the beak like a glove-stretcher, and uses his tongue to grab the animal. He never appears to withdraw it and eat it outside, and he never appears to hit a hidden stone under the mud.

The little Jack-snipe is less particular about his feeding and will eat rush burrs and other seeds. This makes him more independent of weather, and when

the snipe have gone you will often find Jack still on the hill. They are never present in similar proportion to ordinary snipe, but are fairly plentiful in Ireland. In Norfolk one might reckon on one Jack to twenty or thirty ordinary snipe, but in some parts of Ireland you would probably get two or three to the same number. On the other hand, if you are coast shooting the day of a fall of Jack, you might get half a dozen Jack to one or two common snipe.

Snipe are really nocturnal birds, and they lay up in cover during the day. In boisterous weather they are difficult of approach, presumably because they sleep " with one ear half open," but in still weather they will lie close and rise under your feet—if you walk quietly.

The alarm note of the rising snipe is variously rendered. " Scaipe " is a fairly good indication, but it is a shrill sound, rather like a high-pitched squeaky hinge. If a snipe rises without this alarm note it is a Jack-snipe, which is a silent bird and sits as a rule closer. The gunner only hears this note of the snipe's vocabulary ; but in the breeding season he has a monotonous rising and falling double note, which he repeats with some of the insistence of a cuckoo ; and also he has his lovely spring display of " drumming." This is an aerial performance of shooting up and then nose-diving to earth with rigid, vibrant wings, and a roll, which sets the outside tail feathers into vibration and produces a drumming or bleating sound. This has been the origin of many names for the bird in the Northern languages, and " heather bleater " is still one of the English local names.

The drumming of the snipe is a performance well worth a special visit to see and hear. It begins in March and continues often into June, and on an April day, when the marsh is sonorous with the whoo-whoo of the great wing-beats of the lapwing's display, the snipe seem like little speed planes compared with great rolling bomber planes.

They are not apparently afraid of man. The normal wariness is sunk in the spring ecstasy, and it is sheer delight to watch them. They shoot up in a great curve to a hundred feet or so, and then dive down at a steeply pitched angle, tail expanded, wings vibrant but rigid, and, with a barely perceptible side-rock or alternation of keel before they reach the ground, they swing out and rise again to repeat the manœuvre.

The cause of the bleat is arguable. It was long believed to be vocal—a

theory now quite discredited ; then it was believed to be a wing-vibration ; and lastly a specific noise made by the rapid vibration of the two external feathers of the tail. These are undoubtedly the source of the sound, but it is doubtful that they are entirely responsible, and most competent observers now incline to a belief that drumming is produced by these tail feathers but enhanced by the wing-vibration or the use of the wings to set the bird into a state of rapid alternating oscillation.

If these special feathers are tied to a stick and whizzed round like a bull-roarer, drumming is produced. Set on an arrow as a fletcher would set them, they produce similar results ; but the wings are at least responsible for keeping the bird on a fluctuating or rapidly oscillating keel, while arrow flight is spiral, as can be told by attaching a thread to a fletched shaft and seeing how it is wound up.

The purpose of the display is believed to be an enhancement of self-importance in the eyes of the female—a sheer affair of " showing off "—but some bird authorities put it down to sheer *joie de vivre*. This may be so, for at best we only guess at bird psychology; but I confess I see no reason to accept this particular bit of thought until I see a display of drumming by a solitary bachelor snipe.

The hens pay no attention to the display ; but then neither do the reeves when the ruffs are enjoying their tournament, and in general it appears to be correct for the ladies of most birds to show boredom at the vanity of the male. Some women adopt the same attitude, but the more successful ones reverse this procedure.

The nest is made by early April and holds four remarkably large eggs. One would consider six smaller ones a better natural proportion, but most of the waders believe in four eggs, neither more nor less, and do not compete with the game birds or ducks. Late nests seldom hold more than three, and though snipe once hatched are hard to observe, I am inclined to doubt that more than two or three nestlings from each clutch reach maturity. Certainly even in the first days of the season the number of snipe in a small marsh does not, as a rule, seem to have trebled. In general a hot, dry summer, good for game birds, is apparently bad for snipe, presumably because the muds of the marshes are baked hard and feeding ground restricted. But only a very small proportion

of our autumn snipe are home-breeding birds, and the great majority are migrants coming in from the Baltic.

It is very seldom that we are able to recognise a distinct wave of snipe immigration comparable to a fall of cock, but they pitch in by night, hide during the day, and move on rapidly. I am inclined to discount the bird observer and the fowler's observations, for the human being sees on the whole little to what a dog's nose tells him. An apparently barren stretch of fresh and salt marsh which may yield a gunner a few shank, curlew, and possibly an odd duck, will often show snipe in quantity if the gunner has a good hustling dog.

The Jack-snipe is known to us mainly by its silent rise and its disappointing size when grassed. It is on occasion remarkably close-sitting and tame, and in spite of this is hard to shoot, because it is so small that it slips through holes in the shot pattern. It does not breed with us, and we know remarkably little about it, except that although it has no special drumming feathers, it makes a particular noise of its own when display flighting.

There is a good deal to be said about the art of shooting snipe, but few authorities agree on technique. The essence of the matter is a full load of small shot, and we may endlessly debate the particular virtues of No. 8, No. 9, and No. 10, unless we reduce the issue to the gun they are to be used in, and the range at which the shooter takes his bird. A slow shot lets the snipe get well away before he fires, and as small shot loses velocity rapidly he will do better with No. 7. A quick shot, on the hand other, can use No. 9 and do better, for he has 580 pellets to the ounce against the 340 of No. 7. The best compromise is probably No. 8, with 450 pellets to the ounce.

As one does not have to fire a couple of hundred rounds before lunch one can stand a full load of $1\frac{1}{8}$ ounces, but the recoil is noticeable, and a medium powder is advisable, for small shot do enhance recoil noticeably. If you belong to the long-shot school and are a good shot, a very fairly full degree of choke is advisable; if you are a quick shot and fallible, the ordinary game gun will probably do you better.

In general essence the long shot waits till the snipe have ceased zigzagging and steadied, while the near shot takes his chance. Actually the snipe does more than zigzag—he oscillates or banks in the air, and the knack is to get him while he is banking. Most people cannot explain how they hit snipe, but if you watch

them you see them—possibly unconsciously—take the bird at one or other end of its accelerating pendulum swing on the beginning of its rebound. The next thing is, Down wind or up wind? In practice the wind is usually sideways, but in theory, if you walk down wind, the snipe rises head to wind to meet you, and has to go sideways, or reverse, thus staying longer within close range. The up-wind school say that their approach is silent, and, as a matter of fact, in boisterous weather, when the birds are wild and alert, the up-wind school score heavily. In still weather the down-wind touch is probably best. Nine snipe out of ten are missed because of their disconcerting rise. The old cure is to say "Snipe-dead-snipe" before you fire, but this is no advice to anyone with an impediment in his speech, or a sluggish gun-mounting action. Lastly, shoot well over the bird. A snipe is always rising when within range.

Not only weather, but moonlight, influences snipe. During a long moonlit night they feed well, and the next day lie well. A short moon, on the other hand, means hungry, restless birds, and it seems clear that a degree of moonlight is necessary for feeding, which reinforces our belief in a visible external surface food indication before the beak is plunged in ooze. Lastly, the time for snipe is rising dawn or falling dusk, for then they are feeding, or at least restful with the intent of feeding. But snipe are the least interpretable of birds, and though you may know your own snipe marsh thoroughly, the ideas you have worked out there may fail completely when applied to some other piece of ground.

Woodcock are in many ways very like snipe, not perhaps zoologically—although even there, there is relationship—both are *Limicolæ*, of the family Charadriidæ—but certainly in the sporting sense. If we probe further we find that cock slightly resemble snipe in appearance, feed on similar ground, and are equally undependable in that they move with hard weather. In all other respects they are entirely different, but we have the sanction of tradition for grouping these two birds together.

Woodcock is *Scolopax rusticula*, and is, despite the soberness of its plumage, one of the most beautiful of game birds in its perfect adaptation to its environment. It is at its best in its background of autumn leaves and yellowed bracken fronds, and in spring, when the woods still show winter, a sitting woodcock is almost invisible at a few paces distant. You may know where to look and

still not see the bird in front of you, and in the end it is ten to one that you see its eye before you see the rest of the bird. Later on in the year, when the leaf is out, I do not know how they conceal themselves, for though cock breed in my home wood, I have never seen them other than on the wing at dusk during the summer, and for the most part they are totally invisible.

A proportion breed in the country, but a far greater number are passage migrants to our shores, and winter visitors in Ireland. There are indications that our home-breeding stock is on the increase, but whether this is because our generation notices rather more, or whether it is really so, is open to question. Our forefathers, I fancy, barely recognised the bird as a breeding species, and we still know ridiculously little about their habits. They are one of the earliest birds to pair, and nest extremely early. The period of incubation is believed to be some twenty-one days, and an old saying has it that the cock do not nest till the bracken begins to sprout. This may be true in some places, but in Sussex I find that April 25 to 30 is about the time for the nests to come off, irrespective of the growth or delay of fern frond.

Some woods always hold cock, others never do, and although some authorities hold that the cock is a sensitive bird, disliking the noisy activities of pheasants who fuss about in the daytime while he would be sleeping, I think that it is more a matter of environment than anything else. If the wood has adequate streams and some nice adjoining marsh-meadows, the cock appear to put up with a good deal of disturbance. Even rather extended forestry operations have not shifted some birds of my acquaintance. On the other hand, the shy and elusive visiting cock is probably more particular about the noise in his hotel than the home-nesting bird, who is, so to speak, a householder.

The average bird runs about 12½ ounces, and it is held that the male is usually the lighter. Actually, the bird puts on condition very quickly, and though most are in good condition on landing, we find late flights which are poor. There is, I think, always a possibility that these are immature birds from second nests, for though the point is not too clear, I have seen young home-bred cock late in July, which must have been second-nest birds.

The variation in plumage is fairly wide, and many sportsmen believe that there are two varieties of cock—one the small, russet type, and another rather larger kind of greyer tone in plumage. Coast gunners are inclined to credit this,

A Fall of Cock. November Woodcock Resting in the Marram Grass.

but so far no very sound evidence has been brought forward to substantiate the theory.

Our lack of knowledge of these birds is due to the fact that they are nocturnal in their habits. They sleep by day and feed by night, and even in the hungry pressure of the rearing season seldom move before dusk. They will, however, feed on a winter's afternoon, when the sky is leaden and hard weather is coming, and I have seen cock come down on to a snipe marsh in comparative daylight in November.

There is no external distinction between the sexes, and both carry the little trophy, the " pin feather," below the angle of the wing. In days gone by this was the favourite " brush " of the miniature painter, and probably the illuminator of manuscripts; today we still take it as a trophy, but it has, so far as I know, only one practical application. It is when mounted on a pen-holder shaft a perfect implement with which to remove a fly or speck of grit from somebody's eye. Less practical, but rather interesting, is Lord Fisher of Kilverstone's method of mounting pairs of these pin feathers in the game book with date and data all attached.

The feathers are not too easy for a novice to discern, for they are hidden beneath the primary feathers; but if you turn the bird upside down, stretch out the wings, and look one-third of the way down from the top angle of the wing, you will find the little " pin " or " pen " feathers.

The early pairing and nesting of woodcock is now recognised, and sportsmen do not shoot them after January, although in Ireland, where the bulk of the birds are migrants, they are shot very considerably later. In February our coverts are pretty quiet, but there are still matters to be attended to, and it is then, when the days just begin to lengthen, that you become aware that cock are still there, and in March you may see them " roding " at " cockshut time." Special old words these, for what one may call a spring display of flying backwards and forwards along a special line at dusk.

The nest is difficult to find even if you know roughly where it is. A rough dead-leaved hollow containing, as a rule, four rather large buff eggs mottled with amber and ash blotches, it is far more difficult to see than a casually exposed pheasant's nest, in spite of the earlier date of laying and the absence of new ground cover. All authorities agree that cock are among the most solitary

of birds, but a covert which holds a breeding pair will usually hold more. No population is more difficult to assess, but if you watch you will find that all the cock use one particular exit from the wood. It may be a natural entry or it may be a gap among the trees, but in the old days cock were netted at " cockshut time "—i.e., dusk—because of this trait of following a single route. Further, you will notice that inside a wood they fly very low, often barely five feet above the ground, but once outside on the way to their feeding grounds they go remarkably high. Distance is seemingly no object to the feeding expedition, except when nestlings are to be fed. The diet is mainly worms so far as adult birds are concerned, but the infantile food probably contains mixed insects from local sources. You may see cock routing ditches where grubs and insects might be found but worms would not be plentiful.

The essential factor in the bird's life is that its enormous boot-button eyes are adapted for night vision only, and in bright sunlight the bird is obviously half-blind. They will sit quiet as stones in the dark shadow of an old ivied stump or a holly, and a dog will not move them. You will often hear of an " old cock asleep in a bush," but if you look carefully he is not asleep but wide awake, and not going to move for a mere dog. Once he catches your eye on him he is away.

Traditionally he is a hard bird to shoot, actually fairly easy; but his low wavering flight and silent rise introduce special problems. I believe him to be the most dangerous bird in Europe, for the cry of " Mark cock !" converts your steady neighbour guns into dangerous lunatics seized with frenzy. Cock are not by any means rare birds, but they take special rank in the bag, and it is still held to be a special favour of the gods to get the odd cock.

When we reflect that he flies at face level, we realise how very dangerous a bird he is, and there are many otherwise unexceptional shooting-parties where an experienced guest, hearing the warning, will abandon any attempt to shoot the bird and prepare to drop flat on his face while his excited neighbours shoot over him. Cock, I believe, account for more awkward incidents than any other game.

We meet them mainly when early covert shooting in November, for it is about the 6th to the 14th of November we get our autumn " fall of cock." The marsh men know when to expect them, for they are preceded by the little Jack-snipe, and a sprinkling of Jacks on the Norfolk coast means that the cock will

Woodcock "Roding" at Dusk.

soon be in. They come in the night, not in flocks, but in belated solitary sequence or open order, and often in substantial quantity. If the winds are adverse they often make land exhausted, and every patch of marram may hold cock, who sit so close that only a dog will rout them out for the gunner. A favourable slant of wind or the November gales may carry them far inland, and few will rest at the coast. From time to time fishermen or lighthouse keepers report flights of woodcock drowned at sea, and this would suggest that when migrating the solitary habit is broken down, and that some sort of community movement is involved. On the other hand, I have met observers who have seen occasional cock pitch in during the "fall," but never one who has seen a flight, flock, or wisp of cock arrive over the sea.

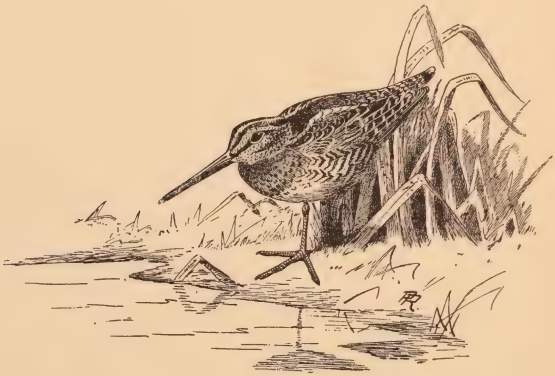
In hard frosts and gales they get bewildered, and in January and February, 1927, one or two even came to London and stayed for some days in Hyde Park. One flew into the arms of a butler in St. James's Street, as though seeking destiny in his kitchen. The majority of migrants move with hard weather, but the home-bred birds tend to stay in spite of all frosts except exceptional hard spells. Possibly the latter are so familiar with local geography that they can get sufficient subsistence, while the visitor, ignorant of resources, must move; but even so, I cannot pretend to understand how my own local woodcock survived the six weeks' hard frosts of the early 1929. All ponds and marsh were frozen hard, but the shallow streams in the coverts were not fully frozen, and were only covered here and there with paper ice. I know the cock were there, but the only possible food supply open must have been an extremely tenuous living from the bed, rather than the banks, of the stream, or unfrozen earth surfaces under snow in the heart of the wood, though the frost went so deep that I doubt that many places penetrable by a cock's bill existed.

The solitariness of woodcock has given rise to the legends of unusual shots, of which Sir Francis Chantrey's two woodcock at a single shot is the great example. It is rather more of an accident than a feat, and has been done some thirty times and even surpassed by one with a first barrel and two with the second—but Chantrey alone was able to sculpture them in stone. Even if some of our most renowned modern sculptors shot half a dozen at a single shot, it seems doubtful if we should recognise them as they would portray them.

In shooting cock when beaten out from covert or in the rides of a great

wood, some shots seem to have the knack of anticipating where the twisting bird will go. It is, I think, not sound reasoning that the bird seeks to put intervening thick cover between himself and the death-dealing gun, but we know how he does use cover. More critically examined, we find the bird flies half-blinded in the light and seeks the heavier shadows and dusk of the tree trunks and evergreen bushes. The man with the eye for cock notes these darker patches or rides, and takes his birds where they will in all probability go.

In great woods celebrated for cock you may get a bag of a hundred or more for the day. You may even see a score or more downed in a day in Sussex or Hampshire, but on the whole they are variable birds, and you may on one day in one year find your covert holding a score of cock and not kill more than a dozen in a year in those woods in the remainder of your lifetime.



IX

DUCK

Mallard, Teal, and Pochard.

Chapter IX

DUCK

THERE is an almost separate branch of shooting which we class under the head of wild-fowling, which deals in the main with wild duck and geese, and to a lesser degree with some of the waders. It is almost purely a longshore and estuary sport and dependent on an influx of migrant fowl. In addition to this we have a certain number of well-organised preserves—and even inland shoots—where adequate water in the shape of lake, marsh, and pond is available, and where a certain number of wild duck are reared very much as we rear pheasants, and provide good sport.

Perhaps this last phrase needs qualification: semi-domesticated wild duck reared in this way may or may not provide good sport. If all goes well they fly high and wild and are perfectly satisfactory; on the other hand, if they are tame and lethargic, one might just as well shoot bullocks at Smithfield Fair. The facts appear to be that, on an estate where the ground and water are naturally suitable and the duck are properly reared, good sporting duck shooting can be enjoyed. On other estates where the environment is not suitable and the area of water restricted or too close to boundaries, duck are not satisfactory, because if they are tame enough to stay in the area, they are too horribly tame to shoot.

In the past—some twenty years ago—there was a temporary boom in duck which led many people to try to put them down in quantity in places which were not really suited to them. They were even packed up in hampers at dawn, taken into the coverts, and released by assistant keepers to fly home over the guns. Sometimes they did, sometimes a pedestrian procession of duck issued from the covert-edge, and with clamorous expostulations walked like fat dowagers toward the disgusted guest of honour.

Incidents like this led to a reaction, and perhaps duck are less used today

than they might be. In essence, it depends on skilled keepering whether tame wild duck can be well shown or are best avoided. All keepers believe they can handle duck ; very few can, and it is as well to make the first few practical experiments before a very confidential audience. The essential is a good natural duck environment, and if this exists it can probably be improved and made better.

Assuming that you have got adequate water, the first and paramount essential is quiet and freedom, not only from disturbance but from overlooking. A screen of reeds, which makes little difference to your prospect, makes all the difference to the duck, and your swept and garnished ornamental lake will not hold duck unless you enclose it with this fringe of respectability.

Next to seclusion comes the problem of food, and in the U.S.A. there is quite a thriving little industry in selling to would-be duck preservers, the commoner English water weeds. Most of these have romantic American names besides their ordinary botanical designations.

Duck foods vary with the quality of the water and its depth. Some water is too salt or too irony for any food-plant to flourish ; others are too acid or too alkaline, and a considerably wide knowledge is required before the potential food value of a given area of water can be estimated. It is admittedly a matter for the expert.

The best general plant is "wild celery." This is no connection of any normal celery, but is *Vallisneria spiralis*, a familiar water plant with long streamers of green ribbon and a celery-like root. It spreads by runners and tubers, and also has a seed-pod, and grows in mildly alkaline or chalk-stream water of depths from two to ten feet. When seed is used, fifty pounds of seed to the acre should give a good result, but it should be planted in the shallower portions and where there is not too swift a current. Seed is usually available from September, and should be shipped fresh and planted at once. A mud or sand bottom is suitable, but it will seldom thrive on clay.

Where the lake margins are very shallow and there is a fair flow of water, few natural foods surpass ordinary watercress. This is best started from cuttings, and once thriving, grows so fast that ducks cannot destroy the bed. It is not suitable for water deeper than eight inches, and is excellent for shallow brooks, water meadows, and feeder streams.

Wild rice has a great vogue in the U.S.A., but has never worked well here. In the first place the seed must be sent over moist or it fails to germinate, and our summers are seldom hot enough to bring it to maturity. In general, it has never succeeded in taking hold, and has died out in a year or two in the broads, where it has been tried and gained a temporary foothold.

Where water is alkaline and slightly brackish and contains adequate lime, chara is an excellent plant. It seeds in the autumn and can be sown by broadcasting fragments of the plant bearing the seed-vessels. A basis of four bushels to the acre should produce an adequate bed in the following year.

The many varieties of potamogeton are nearly all useful, as they produce not only seed but succulent roots and tubers. There are many varieties which suit different depths, and all these—naias, or bushy pondweed, water-plantain (*Alisma plantago*), arrowhead (*Sagittaria saggitifolia*), and other floating or submerged plants—have their uses either as direct food-supply or as covert for fish-fly and water-snails, which are also duck food.

The large burr reeds, bulrushes, and iris are all useful for screening and providing cover and nest material, while a pad of water-lilies adds to the beauty of the water, though the ducks will as likely as not root up portions of it.

In practice, a small area of pond is not worth planting with food, but if the area is at least three to four acres it can be made into a food-lake, provided that the side-screening with reeds is adequate. Ducks like an island site, and if the lake is shallow an island can be improvised with a few big casks full of soil sunk upright in the water and planted with sallow cuttings.

In addition to natural food, we can feed our duck with corn upon the water, and it is astonishing how soon they find out that a regular supply is available.

Having a suitable lake, the best way of encouraging wild visitors is to have some tame decoy ducks on the water. The wild migrants see these and swing down to them. The cross-bred decoy ducks used in Norfolk are the best for the purpose, but if you intend to rear and shoot wild duck, domestic duck or any duck with a dash of the domesticated blood in them should be kept off the water, or misalliances are bound to occur. Swans, coots, and other water birds should not be unduly encouraged, as they are jealous in the nesting season, and

the seemingly harmless moorhen is not in the least above making away with somebody else's eggs.

The greatest duck enemy is probably the rat, not the harmless and vegetarian water-vole, but the ordinary farm or rick rat, who moves in the early spring from the rickyard and usually seeks a water environment, for he is a curiously thirsty creature. Next come pike, who have a weakness for young ducklings. Rats are best dealt with by a barium biscuit poisoning campaign. This is harmless to ducks and most domestic animals. Pike represent a serious problem. Netting is probably effective only to a limited extent, and poisoning with solution of cocculus indicus is too wholesale in its effects. Intensive netting, followed by a long course of night lines, is about the best method, and the Thames Angling Society will often be glad to come with nets and special carts to take your coarse fish which you do not want to some happier environment where they will gladden the heart of the contemplative angler and give sport to the working man.

Of the mass of duck which visit this country only a very small proportion are home bred. By far the greater number come in the autumn as migrants from the Baltic. Our home-bred duck are actually slightly increasing in number, but the migrant stock is diminishing every year. The situation is one which causes some uneasiness, for it is one which can only be met by general international agreement among the West European nations, and it is also a matter which affects the livelihood of the Dutch and Danish decoy men.

Investigations have been going on for some years, and the very able ornithologists who represent the international committee have a fairly clear idea of the external causes leading to the diminution in the European supply of migratory fowl. They still have, I suspect, something to learn about the internal or economic causes, and though reciprocal legislation, such as has been passed between Canada and the U.S.A., is the solution, some time may elapse before it is possible to educate public opinion in the smaller and more backward North European States. Until then the vested interests of the decoy and net slaughterers and their associated cold storage firms will have the game in their own hands.

In general, the committee of investigation conclude that the ordinary wildfowler and shore gunner are not harmful. This is, as anyone who is familiar

with the time taken to get half a dozen brace of autumn duck knows, self-evident. They condemn, on the other hand, punt guns. These are more in use abroad than on the English coast, and so far as our own punt gunners are concerned, the slaughter they achieve is negligible. In the days of Colonel Peter Hawker or old Folkard this was different, but today you may find old and new guns hung up disused anywhere in the fowling districts. The game does not repay the cost of powder and shot.

A little punt-gunning still goes on. It is mainly that of amateurs who like the ardours of a gun punt and the bleak and solitary miseries which precede the cannon's fateful shot. Of late years I gather that the degree of misery involved is reckoned the highest part of the sport, and as the professional gunners, who were proof against all discomfort and reckoned game in terms of a hard-won living, have stopped gunning, it is pretty clear that the punt gun as an economic factor is obsolete.

I hold that the only way of enforcing any kind of bird or game preservation laws is to deal with the economic factor. The gist of the thing is that sale should be stopped and exposure for sale stopped. So long as a thing is marketable it will be shot. Stop the market and you reduce the whole thing down to the familiar factor "it is not worth it." You deprive your law-breaker of his disposal mechanism, and the only dangerous law-breaker is the one who is, so to speak, a professional.

A reputed dearth of lapwings has led to the protection of the lapwing, or the green plover, and their eggs. It is illegal to sell either or expose them for sale. You may shoot plover if you want to, on your own land, but you cannot shoot plover for the market or send up their eggs to market. This has "killed the trade." It is a benevolent experiment, but whether it will be successful or not needs another decade to determine. The plover are odd birds given to special local migrations, and their first clutches of eggs are often hard hit by frost. The sentimental bird-lovers are all out for the universal protection of the lapwing. The sportsman, who as a rule knows a bit more about birds even if less about their latest Latin names, is a bit dubious, but the plover is a useful bird to the farmer, and if at the end of a few years we do not find such an enormous overgrowth of plover as full protection should accord, then we must admit that there is something—probably the balance of Nature—which is against it.

The duck problem needs tackling on similar lines. Duck considered as a national food-supply is entirely rubbish. We certainly eat a few, but so far as the market for fairly shot duck killed in season is concerned, it is a negligible factor. Some 90 per cent. of our shop-sold wild duck arrive in cold storage from "somewhere in the North Sea or the Baltic." They are on sale and menu during our close season.

If we limit the legal season for the eating of duck to the legal season for the shooting of duck we get to grips with the problem. It will not pay the market-shooting or neck-twisting Souwegian to kill duck before or after the season, nor will it pay the ice-houses to store up duck in the freezing plants. General agreement on a European close season, not only for the taking of duck, but its sale or exposure for sale, is going to make the game unremunerative for the bird-slaughtering interests. This is good for sportsmen, for what is happening is that netting on the Baltic coast, decoys worked by the Dutch and Danes, and a variety of slaughter mechanisms designed not to benefit sport but to bring dead duck to market, are depreciating the world supply of birds.

The sportsman is entitled to what one may call the surplus over and above the migrant stock necessary to maintain the average. Shot-gun attack, however heavy, within the limits of close seasons is not in the least likely to affect this, but a decoy where thousands of ducks are strangled annually is a permanent and discreditable engine of commercial destruction.

The duck which come under the heading of wild fowl comprise both sea-duck and estuary or land duck. The latter alone have commercial value and are disproportionately subject to market attack. The mallard, wigeon, teal, golden-eye, pintail, and shovellers are the main marketable varieties. The black sea-duck, such as scoters and the varieties of wild and doubtfully edible geese, are not heavily molested ; and the waders, other than golden plover, seldom reach a market.

In general, the sportsman should never shoot inedible birds unless there is some reason for their destruction. It is admissible that cormorants should be shot, for they destroy fish in some quantity, but gull shooting is unthinkable. Wild geese are regarded as a quarry of some importance, but both these and swan are birds which are only edible in the sense that they save the cost of butcher's meat to a needy longshore man. As time goes on it will be, I fear,

a little difficult to find justification for shooting them, and they are now only common in those areas where a big sanctuary of preserved land affords them a safe refuge and feeding ground. They are one of the attractions of Wells, in Norfolk, which adjoins Lord Leicester's estate of Holkham, and guides may be hired at the hotel to take the adventurous visitor out to shoot at wild geese.

Our ordinary wild duck—the bird people mean when they speak generally of duck—the mallard, known for years as *Anas boschas*, but now converted to *Anas platyrhyncha*, a splendid word test for the temporarily afflicted motorist. They are well distributed all over the globe, and are believed to be the ancestors of all our domestic duck. In any case, the mallard drake will interbreed with them in picturesque fashion, and most of the crosses are fertile. Seemingly, most of our wild duck will cross on occasion, and specimens are often shot which, being young and not in full plumage, are obviously some kind of a mixture but defeat local ornithologists.

The home-breeding duck represent possibly one-sixth of our mallards, and the greater proportion are migrants which come in as the Northlands begin to close for the winter and the hours of light begin to alter. Our first wave of invasion is usually teal, but the critical week for duck is normally about October 22 to November 1. They begin to come in as small parties early in October ; during the second week in October you may expect a small invasion ; then comes the lull, and if winds and weather are favourable, the full wave comes in the last week of October. If it does not come within this particular ten days, experience suggests that it will not come at all that season, and that bags of duck taken on a systematic average will vary from one-half to two-thirds of the average bag in the bumper years, when we get a good influx of duck in the critical week.

A great deal of time has been devoted to migration, but the results of research are not very illuminating. Since the war daily soundings, not only of the direction of the ground wind but the direction and velocities of the upper air currents, have been taken at various aerodromes. An analysis of ten years of duck records and ten years of air records for the critical week showed no useful guidance at all. Possibly the upper winds at the point of departure, and over the main sea and coast areas, might determine some rational factor to account for directional flight, but it is quite possible that we are all wrong in considering

winds as the really important factor. If they reach gale force, obviously they are the determinant, but it seems as if we should look for some other factor to account for migrant bird vagaries in normal autumnal weather. I am inclined to think that the sense of vision may be far more important than ornithologists have thought. This need not necessarily be held to mean clear vision of shore lines or land masses, but rather more of a response to light, an unconscious movement toward light.

So far as we can judge, about one year in every three, 30 to 40 per cent. more duck come to this country independent of such little knowledge as we can gain of the prevailing earth or upper wind currents. Careful analysis of the latter shows nothing on which any reliance can be placed. It remains to find another hypothesis, and I put up this idea with the frank admission that I have no shadow of proof to adduce, but that it seems worth while suggesting a new line of thought for observers to investigate. A stream of successive flights of duck along the North Sea might conceivably come to us if the light conditions were attractive. A dark cloud bound east and a clear and luminous west might be the determinant.

Many theories have been suggested to account for migration routes. Magnetic lines and unknown senses have been invoked, but in general, taking the lower forms of animal life susceptible of regulated experiment, magnetic sensibility seems unproven, while susceptibility to light is very marked. The height of migration is not in the very high levels, but at most between two and three thousand feet. At this height visibility of land masses would be fair but not a great guidance to human eyes while night flying. Yet in the years when we have moderate winds rather than gales, then, irrespective of the quarter of the wind, duck apparently come in in full quantity. Duck vision is doubtless far different from our own, but if we begin to consider the subconscious or instinctive duck mind, either clinging to the retreating darkness of the west or sheering away from a cloud-banked European coast, we have an entertaining line of thought which may prove to be some guidance to the solution of the mystery. Anatomically considered, the duck's eye is not essentially that of a night-feeding bird like the owl or woodcock, but, nevertheless, duck do feed almost entirely by night, although they potter about on ornamental waters and mud flats and feed sporadically by day.

The range of night-feeding is a fairly wide one, and birds will come from several miles to a specially attractive food centre. Sometimes, if not disturbed, they will take up quarters there, and many of the home-bred wild duck seldom seem to migrate or even to leave the place where they are bred, though they will flight at dusk from the broad or lake on to not too distant stubbles.

When establishing a wild duck reserve, stock can be secured from the migrants which come to your tame decoy ducks. These are regularly fed at a cage, a simple structure of wire netting built out like a boat shed, partly on land, partly over the water. It should be about six feet high and five yards broad and some twelve or more yards long, according to situation. The door or gate side facing the water is left open overnight and any strange ducks which have come in will probably follow your decoys to the feeding place, when a simple string and pulley arrangement worked from concealment is used to close the water-gate. Strange ducks are then hand-caught and pinioned. Drakes caught in this way usually pair and breed with the stock the following season, but the ducks are more sensitive, and do not always breed in that year. It is sound practice to put them out in a similar cage with a few stock birds until they get used to their new food and surroundings. If the traps are set going in the autumn, a good nucleus stock can be worked up for the following breeding season, but it is always better to supplement with bought eggs or birds to begin with. An excess of drakes is a nuisance, but if you have excess ducks wild drakes will probably arrive to mate them.

Preparations for pairing begin in February with duck, and the great art is to provide attractive nest sites and material as an inducement to early laying. Comparative darkness and draught proofness are the great desiderata in nesting sites. Carefully arranged piles of brushwood or broom, and ample hay or straw, provide an attractive basis, and an old straw-stack is a certain draw. Laying begins early but sporadically, and early eggs before mid-March need to be collected before they are frosted. A duck-sitting is thirteen eggs, though in nature they often attempt to hatch sixteen. Even if they succeed they cannot successfully brood so many ducklings, and casualties occur. Hens will cover twelve duck eggs, but often prick them ; but as you can reckon on twenty-four eggs from each duck if they are properly fed, this allows a dozen for the hen and a dozen for the duck to hatch. In practice about 75 per cent. of the eggs

hatch, and of the ducklings 75 per cent. reach maturity if all goes well. The first point is to see that the ducklings are not led off by mother-duck to water. This is natural but fatal to too many ; they should not go to water till six or seven weeks old. A smart keeper watches for the hatching (it may be anything from twenty-four to twenty-nine days of incubation), and coops the old duck with the ducklings in a chicken run on grass.

Feeding must be clean and fresh. For the first twenty-six hours they should have no food ; for the first meal nothing beats the homely cold bread and milk of the farmer's wife stiffened with fine ground oats. A saucer of fine sand or earth should also be available as a grit supply. The food should be crumbly and not sticky, for they are messy feeders. A meal made of—

1 part Sussex ground oatmeal
1 part best middlings
1 part biscuit meal

is the basis. At a week old 5 per cent. fish meal is added, increasing to 15 per cent. at the month. The varieties containing cod-liver oil are the best, but this can be added separately. Fresh grass growth in the run is important, and dried yeast can be used as a substitute for vitamin B sources if grass is backward. At three weeks old, barley meal or maize meal can be substituted for the ground oats, but barley meal needs sparing use. The great thing is to get them on to corn as soon as possible. From a fortnight on a little steeped wheat or "seconds" should be dropped in the drinking water. At five weeks they can have barley, and at seven weeks should be independent of meal.

A very limited amount of finely chopped fresh-cooked meat should be fed occasionally, and whenever milk can be used in place of water in the earlier feeds it should be used. Ducklings eat enormously, and for the first month give four feeds a day, changing to three a day for the next fortnight, then to twice a day on grain till full-grown. A good deal of the mystery surrounding so-called "wild duck meals" is simply a matter of oil. These meals are expensive and not as a rule particularly well balanced. The points to bear in mind are that in nature the duckling has a very wide range of accessible green food with a high vitamin B content, and also gets, in the shape of algæ, a rather higher phosphorus ratio than is normal with land birds. If, in order to eliminate to

accident and vermin casualties, we coop and run our ducklings for the first seven weeks, we must provide as well as we can substitutes for the elements they would obtain in normal weather on a free range. Dried yeast will act for green food, cod-liver oil for the essential oil of snail, fish fry, and frog spawn, and a cup or so of bone meal added to the mash will supply adequate calcium and phosphorus. These matters need balance, and where excess of the oil and animal ingredients may do harm, excess of yeast appears to be within limits innocuous. Milk may be looked on as a substitute for both calcium and phosphorus, and bone meal is not as good as milk, either fresh or dried. Greaves is to be avoided, and the sooner the proportion of biscuit meal gives place to natural food the better. Biscuit meal is made of widely varying material, and until it can be guaranteed as regards nutritive ratio and freedom from fungus-infected grain, it should be looked on with suspicion. At present there is nothing but the manufacturers' encomium to recommend it, and the term is so wide that biscuit meal may mean either food fit for human consumption or food which will produce deficiency diseases or toxic symptoms in pigs. Foods like fertilisers should always be compounded of known materials.

Ducklings need, in addition, plentiful water, and this should be pond rather than tap water. The reason is not clear, but probably the minor forms of life present in pond water are important as starting cultures of the proper digestive bacteria in the intestinal tract of the duckling. Lastly, there is the necessity of shade ; they bear sun badly.

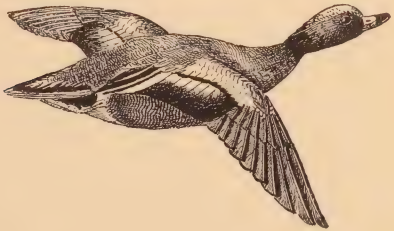
The diseases of duck are mainly leg-weakness, or cramp, which can be cured by adding dried yeast to the meal ; and tuberculosis, when birds go thin and do not thrive. Occasionally this is due to a congenital defect or bad digestion. Isolation and a diet of bread and milk will cure the latter. If this fails, suspect tuberculosis and kill the bird and burn the body. Overeating with crop binding is a visible affliction. Treat with a teaspoonful of salad oil and mild massage of the crop. If the stoppage is due to impacted grass, cut the crop at the top of the neck, remove the wad of grass, and sew up the crop and the skin. Keep the bird on light bread and milk for a day or two in the dark, and the wound heals astonishingly rapidly.

Duck, owing to their rapacious appetites, are expensive birds to hand rear. In general, the greater economy comes from feeding, and not disturbing a well-

planned duck reserve. The yield of duck is perhaps half what intensive rearing would bring, but the cost is barely a quarter, for the real wild duck require no labour other than the provision of pleasant and attractive nesting sites, a few decoy birds, and regular feed for adults.

The general argument applying to mallard also applies to all the other duck, and a natural reserve will hold many varieties. When new kinds are bought they should not be immediately released to water, but held up in pens and fed with oily food until their plumage recovers. A shop-bought duck imported from Holland is usually in poor feather. If launched to freedom it gets wet and gets pneumonia, as the feathers are too dry to repel water. A spell of conditioning and an oily diet will restore the balance, and a conditioned bird can be released without fear of loss.

Any fat will help to grow natural oil, but the vegetable fats, such as linseed and cottonseed oil, are variable quantities in proprietary meals. Linseed or oil-cake are good foodstuffs, but a measured quantity of the best Parke Davis cod-liver oil, with a known and guaranteed vitamin quantity, is the best source of oil for birds and is not expensive when results are considered.



X

DUCK, GEESE, AND WADERS

Gadwall

Wigeon and Pintail of the Flats.

Chapter X

DUCK, GEESE, AND WADERS

IN general, when we talk of inland duck shooting we mean mallard and teal, and very occasionally gadwall, or garganey. As we get towards the coast we get broadland and estuary shooting grounds where pochard, wigeon, the wild geese, and coastland duck come in, and, lastly, we get the true sea-ducks who are deep-water divers, and the rarer sea-ducks. We also get the wide range of waders, which include curlew and the plovers, red-shank, and a wide variety of small migrants and winter visitors. These come under the generic heading of wild fowl.

The wild-fowler is usually a shore shooter, though a limited number of gun punts are still in use in localities where the coast affords suitable areas of mud flats and tideways. The punt man shoots on occasion a number of sea-duck which the shore shooter can never get near, and sometimes a mass shot at a flock of mixed fowl on a mud bank brings unusual specimens to the bag. Most wild-fowl enthusiasts live on the coast and get such sport as opportunity affords them throughout the season. As wild-fowling is almost entirely dependent on weather and tide, it is obvious that local habitation is necessary ; sport is never certain. In addition to the local residents there are a few optimistic visitors, often shopkeepers from the Midlands, who like to slip down to the coast for long week-ends, and hope to shoot a few fowl from quarters at a nearby ale-house. All good marshland shooting which is worth shooting is preserved, but the sea walls and the stretch of foreshore between high- and low-water mark are usually public ground.

It can be fairly well taken for granted that public ground is heavily shot by the local longshore men and professional gunners, and that it is not likely to yield a visitor much sport. There is, however, usually a professional guide or gunner available who will take out visitors, and on occasion one can enjoy

a day or so of arduous endeavour and watch fowl, even if one brings little to the bag. On a privately owned marsh or broad which is not too consistently shot very good sport can be enjoyed if the weather has been favourable and the birds are "in the marsh," but I am inclined to think that such a marsh is far more interesting in the breeding season than in the shooting season.

The bag in wild-fowling is very mixed and various and often extremely light, but it has its own peculiar charm, for it takes one down to the sea and the keen air of the coast, into the great solitudes of the mud flats and marshes, and out over grey-green stretches of sea-pink and lavender on to shingle banks and marram-fringed sand-dunes. This in itself is the best of wild-fowling, for it must be admitted that the sport demands much of its votaries, who must struggle against wind and rain, through deep mud and driving sand blast, if they are to succeed in their chase of the elusive wild goose, or even bring back a modest brace and a half of duck.

The geese can be divided into two groups: Grey, or inland feeding birds, and Black, or sea-geese. In hard weather, however, both kinds will feed inland on marine marshes.

The Grey Geese are *Anser cinereus*, once a common breeder, but now very rare and only breeding in certain isolated parts of Scotland, the Bean Goose, *Anser segetum*, the Pink-footed Goose, *Anser brachyrhyncus*, the White-fronted Goose, *Anser albifrons*, and perhaps we should include the lesser White-fronted Goose, *Anser erythropus*, which is extremely rare in Britain.

The Black Geese are the Brent Goose, *Bernicla brenta*, and the Barnacle Goose, *Bernicla leucopsis*.

From a practical point of view wild geese are poor eating, and vary very widely according to what they have fed on. A young five- to six-pound pink-foot goose is not bad when he has been feeding on corn and barley stubbles; grey lags and bean geese are rather larger, and a seven-pound bird is often fairly edible, but any bigger goose is usually old, tough, and oily flavoured. The first geese usually come in late in September, mainly pink-feet, which are common in Scotland and on the West Coast and fairly distributed from the Humber to Wells. The grey lag, bean, and white-fronted geese of Eastern England seldom arrive before October, and the black geese, mainly Brent, do not as a rule arrive in quantity till Christmas.

The attractive factor is good marshes, protected sandbanks out at sea, and a suitable environment, but above all things, suitable food. Geese are grass-feeders, but they like best of all corn, either seed or sprouted winter wheat. They will often take clover or small potatoes in the Lincolnshire fens, but land feed is indispensable to them if they are to stay the winter through. The black geese, on the other hand, feed mainly on the *Zostera marina*, or grass-wrack fields of the estuary mud flats, and the Barnacle, though nominally a marine feeder, is often on the grass of the marshes. Curiously enough, the Brent is by far the better of the two to eat, despite its exclusively marine diet. The shooting of geese is mainly a matter of digging a pit near their feeding ground, or lying out on the line of flight between their day resting place and the feeding ground, and taking them as they flight over.

Heavy shot and a full-choked gun with a powerful charge are essential. To a limited extent sport may be enjoyed with decoys, preferably tame live ones, or at a pinch stuffed geese ; but decoys are on the whole very little used for wild-fowling in this country. They are seldom very effective, largely because of lack of skill in placing them. Even the best of decoys will not attract wild birds to an obviously suspicious locality. The biggest bags of geese are often made by farm hands who get within range of a grazing flock on a field, rather than the wild-fowler who haunts the coast and marshes. In general, geese are very local and are seldom found in quantity except at special wild-fowl resorts. Numbers frequent the loughs and estuaries of Ireland, but their attraction is mainly for the sporting native and occasional wild-fowling visitors, who may or may not get a successful shot or so during the weeks they spend in their pursuit.

Between the geese and the ducks comes the common Shelduck, *Tadorna tadorna*. This is a fine and beautiful bird, but completely useless and inedible. In the winter it is wild and mainly haunts the sea, but in spring it comes inland to breed in the marsh rabbit-warrens, and is a tamer bird astonishingly interesting to watch. Several shelduck often seem to use a communal nest in a rabbit-burrow, but somehow each secures a family of its own. In Essex I knew one shelduck which burrowed into a hay-stack in a marsh meadow and hatched off successfully. The stock is undoubtedly increasing, and it may in a very few years be more widely distributed.

Among the true ducks other than the common mallard, the Teal is perhaps the commonest in general distribution. The Teal (*Querquedula crecca*) is the smallest of our ducks, seldom exceeding fourteen and a half inches. It breeds fairly widely in the isles, and is one of the earliest migrant ducks to arrive, coming in in small trips or flocks in early September and spreading rapidly from the coast inland. It is essentially a fresh-water duck, but prefers streams and running water to either marsh dykes or slow lagoons. Big flocks are unusual, and one usually finds a dozen or so birds scattered fairly widely apart; but sometimes teal haunt fresh-water marshes near the coast in flocks of twenty or thirty birds.

Despite their small size they are a very sporting bird, for they fly very fast and rise at an extremely sharp angle and at great speed. They will sit fairly close in thick reed cover, but when put up by a dog afford magnificent high shots. They are I think easier to kill than many duck, and a pellet or two will often bring them down from heights which appear almost out of range. They are exceptionally good table birds.

The Garganey, or Summer Teal (*Querquedula querquedula*), is very like the common teal, but has a white eyebrow and is slightly larger. It is a summer visitor and breeds, but it is not abundant. I am inclined to believe the species is increasing, but this may only be because it is more frequently identified. It is when young easily confused with ordinary female teal.

The Gadwall (*Chaulelasmus streperus*) is fairly common in East Anglia and has other local distribution. It is often turned down on ornamental waters, and has turned from a tame to a wild variety. They are often called " grey duck," and can be recognised by the yellow feet with black webs. They are very good as stock birds on a lake and attract ducks of other species; as table birds they are quite good.

The Shoveller (*Spatula clypeata*) can be immediately recognised by their spoon-shaped bills. They are one of the commonest ducks abroad, but though not rare in England they are not very common. A few breed, and the young are shot in the early part of the season, but very few seem to come in later. Odd pairs occasionally turn up, but as a rule one hears very little about them. They are not bad eating, but owing to their feeding habits, which consist of straining mud and stagnant pond growth through their bills and swallowing

the minute water insects, they often have a peculiar flavour. In hot countries their feeding places are often very nasty, and they are not considered fit birds for the table.

The Tufted Duck (*Nyroca fuligula*) is a magpie-coloured bird with a tuft of feathers at the back of its head. They are very visible, but the female is brown and white rather than black and white. A few usually come in in October, and it is found on salt as well as fresh water. It does not rise well, but tends to swim and dive like the common black sea-ducks. It is sometimes mistaken for the Golden Eye, and though nominally a winter visitor, appears to be increasing as a breeding species and gradually becoming more common.

The Wigeon (*Mareca penelope*) is one of the commonest coast and estuary ducks and is, like the Brent, a feeder on *Zostera maritima*. It is nevertheless often found on fresh as well as tidal waters, and will feed on grass meadows. The wild-fowler probably shoots more wigeon than mallard, for the birds come in in enormous flocks during the autumn, and successive companies arrive as the weather gets colder in the Baltic. The call note of the bird is distinctive and is the "whee-oo, whee-oo," from which they get their name ; it is, however, only the drakes which call. They are restless fowl and feed by day as well as night, and provide very good sport when flighting into land as the tide rises and covers the mud banks. They are edible but not particularly good table birds.

The Pochard, or Dun-bird (*Nyroca ferina*), is very like the Red-head Duck of America. It is essentially a diving fresh- or brackish-water duck, and is the familiar duck of the broads and fens. In the older days incredible numbers were caught in nets and decoys, for they are nocturnal feeders, and though feeding by day well out in the centres of big expanses of water, come in at night to smaller and shallower ponds.

A certain number breed here, but the majority are undoubtedly migrant, arriving in October and leaving early in March. In older days they were a widely distributed home-nesting species, but today they are very limited and even the migratory stock appears to be less. Its distribution is decidedly local, and it is seldom found away from big sheets of fresh water of considerable depth. Big bags are sometimes made by fen gunners with large-bore shoulder guns, and an occasional drive at dawn on a private broad produces a moderate bag ;

but it must be many years since anything equalled the quantity of pochard recorded by Folkard as taken by the drop-nets at the Goldhanger ponds in Essex, when five or six hundred " dun-birds " at a drop were reckoned a moderate catch ! Today these decoy ponds are derelict and no one will regret their passing.

Pintail Duck (*Dafila acuta*) are fairly common in Scotland and found in modest numbers on our East Coast. They must not be confused with the Long-tailed Duck: the latter is black and white, while the pintail is grey mottled, and in the case of the female, brown mottled. Few duck surpass pintail in table quantities, and the bird is often called " sea-pheasant " by poulterers. They associate with wigeon and are late arrivals on the coast.

The Golden Eye (*Glaucionetta clangula*) is fairly rare, but comes in in hard winters and is found on inland waters as well as the coast.

In addition to these we have the diving sea-ducks, or black duck, which are wholly inedible. The Scaup (*Nyroca marilla*) sometimes comes on land in hard weather. The Scoter (*Œdemia nigra*), or Black Duck, the Velvet Scoter (*Œdemia fusca*), in the North the Eider-duck (*Somateria molissima*), the Mergansers and Goosanders, Cormorants, Shags, and occasionally the Smew, fall to the mixed bag of the punt gunner, but seldom are seen within range by the coast gunner. The latter, however, has a wide range of waders with which to fill his bag.

The waders are essentially a mixed bag, but in point of fact one shoots very few of them, not from lack of opportunity but from lack of interest. Golden plover, young curlew, and whimbrel are all legitimate quarry, for the plover are good to eat and the others can be eaten. The rest of the waders are only eatable by strong-stomached fisher-folk, but a youngster or a novice will probably shoot most of the scale in order to learn what birds they are. As they are there in enormous quantity, this small toll can do no harm, and the occasional shot taken by a punt gunner at a thick flock of knots means a cheap supply of birds for the coast-dwellers.

On inland waters we find the Water-hen (*Gallinula chloropus*), and although not regularly shot it should not be over-encouraged, as it is in the spring a hungry and pertinacious egg-stealer. Wild duck and even pheasant nests are raided.

The larger Coot (*Fulica atra*) is usually found on wider expanses of water and on brackish leas. There are annual coot shoots at Abbotsbury and Slapton Lea and similar stretches of water, where the bird affords fair shooting, for it is quick on the wing and rather deceptive. Numbers need to be kept down, as water continuously disturbed by numbers of coot holds far fewer duck.

The common Heron is found on fresh water and also on the estuaries and saltings. They are stately birds and harmless except to trout fisheries. There they are a pest and are rightly shot, but in the normal way one leaves them alone.

The Golden Plover has no hind toe, a point to bear in mind when it appears on the menu but some other type of " hen-footed fowl " is served in its stead. It is one of the swiftest of birds, comparing well with the bar-tailed godwit in this respect, and it requires neat, straight shooting to bring it to the bag. Some authorities speak of it as being in flocks of great number, but I have as a rule found that a dozen or so birds represented a unit. They are most common in early autumn, but go south as soon as hard weather sets in. Big concentrations usually precede a migration flight, and are from the gunner's point of view seldom approachable.

The commonest marsh waders are the Red-shanks and the Curlew. The Red-shank (*Totanus calidris*) is a noisy pest whose sharp alarm note serves to warn the whole marsh. They breed freely and are increasing and extending their range. Normally a very shy and cautious bird in the breeding season, they are tame and fearless. Young red-shank have light orange to yellow legs, but must not be confused with that very rare bird the true yellow-shank. They can be eaten but are poor fare. The Green-shank (*Totanus nebularius*) breeds but usually migrates by September; a very few may stay the winter through.

The Curlew (*Numenius arquatus*) is the biggest of our waders and is a fine bird. There are uncounted thousands of them, and their call is one of the most familiar notes of the marsh. They breed on the high moors but come down to the coast early in August. The young birds can be shot from September, and fresh from inland feeding are quite good eating. The mature specimens later in the season fed on sea-worms and shellfish are very fishy and well worth avoiding; they represent nevertheless an important item in the longshore man's larder.

The Whimbrel, half-curlew, or May bird (*Numenius phæopus*), is smaller than the curlew and has a shrill call note. They migrate south before mid-September, but are quite good eating when young. They return punctually in the first four days of May—hence the name " May birds."

Among the smaller waders are many species: Knots, Dunlin, Stints, Turnstones, the brilliant orange-billed red-legged black-and-white Oyster-catcher, Sandpipers of some six varieties, and occasional rare visitors. An expert and experienced fowler can distinguish some of these varieties by their flight, but in general, close scrutiny with field-glasses is necessary. They gather in great flocks along the edge of the tideway, and there is incessant wheeling of the squadrons in the air. In general, these small birds are seldom shot, but the professional gunners may shoot rarities for their market value to bird collectors, and on occasion the blast of a punt gun takes toll and the gunner finds odd birds among the common slain.

Shore shooting is a very delightful occasional sport, more perhaps for the diversity of the slender bag and the delight in the surroundings than for any serious matter of skilled shooting. You may wander happily along and you will, except by accident, shoot little, or you may dig a shelter pit in the lea of the shingle bank or behind the sea wall, or lay up in marram grass and shoot at passing fowl. These are idle and luxurious methods of toying with the sport, for your true enthusiast rigs himself up in thigh-high rubber boots, arms himself with powerful artillery, and seeks a station in one of the mud creeks which seam the level surface of the marsh. There, knee-high in clinging black clay and hidden, he waits for fowl to pass over his gun muzzles. It is, let one say at once, a very different class of shooting from game shooting, and your good game shot is puzzled when he finds that he has to shoot from impossible positions, cow-hocked in gluey mud, which arrests all swing or foot-work. It is, however, only a matter of knack and can be acquired with practice.

Still further knowledge is required to make a sure thing of using a heavy goose gun when flat on one's back against a sand-dune or on a shingle bank. Some suffer these discomforts with equanimity ; others find that interest soon palls ; and a few rare souls make a pleasure out of enforced opportunity and become solitaries, gentlemen wild-fowlers who in the process of time can hardly be distinguished from the professional longshore men.

The occasional amateur, by which I mean the sportsman who likes a little odd wild-fowling, will be well advised not to take the endless boasting of the professionals too seriously. Do not hope for bags of geese or a score of duck; be grateful for an odd bird or two, and go down for the trip and the surroundings rather than the bag. Above all, do not take a good expensive game gun, but a plain cheap full-choked wild-fowling-piece. It may seem extravagant to buy a special gun, but blown sand from the dunes, salt mud, and the environment of wild-fowling play the deuce with a good gun.

In general, the pleasantest sport and the freest from unnecessary gear and the panoply of serious wild-fowling is flight shooting along a sea wall or sand-hills. Time and tide require careful thought, for the duck come in at half-dusk and at dawn. Sometimes one period is more convenient to the gunner than the other, but there is little to choose between them. The dusk flight, when the birds come in from the sea, is often at its best when tide makes early, for then other birds beside duck come in off the tide grounds, and coasting along shore afford mixed shooting.

A certain amount of local knowledge is necessary to pick up good flight lines, and the flight may only last a few minutes rather than a full half-hour before light becomes too bad to shoot by. Moonlight shooting is usually waste of time, but is worth while trying for the sake of the experience and the sight of marsh and sea in half-moon. One should be accompanied by a professional, for accident at night on a marsh is uncomfortable.

The whole art of fowling is invisibility, and background is more important than cover. I believe in mask and gloves as effectively concealing the betraying flash of flesh, and cramped positions are abominable. It is far better to stand upright against an old post than crouch uneasily in a concealed hollow.

In fowling the luck of the day is the predominant factor. Some years ago I went down with a friend who had a yacht on the Medway. He was not a wild-fowler but a keen yachtsman. I took a game gun with me—in hopes—and he had a gun of sorts on board. We went ashore at some nameless island in the marshes, stood under an embanked sea wall in the dusk, and shot between us twenty-seven brace of birds. Twenty-nine wigeon, fifteen mallard, six curlew, three teal, and three gadwall were gathered, and another dozen birds could not

be found owing to the fall of light. By half-past eight that evening I was back in town and having dinner at my club.

I have been to the same place several times since, and under the same conditions, or approximately the same conditions, of time and tide, and have never got more than six brace of birds. It just happened that that particular autumn evening everything was just right.

Inland, when duck were flighting at dusk from a chain of lakes in a big park to stubbles on a neighbouring three-hundred acre shoot, I have known three guns get seventeen brace of mallard in three-quarters of an hour, and I have known many days when hard walking only yielded two or three brace from acres of most attractive marsh.

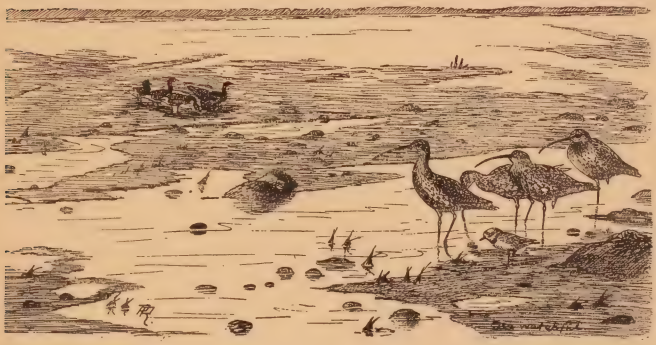
I have known conditions when birds lay like stones in the reed and were with difficulty pushed out by the dog, and other days on the same ground where the moment the guns got on the levels every bird in the marsh got up and flew away. Wind, light, tide, and above all chance, are the factors in wild-fowling.

We read with some sense of envy of wild-fowling as it was in the past when wide areas of fen and marsh teemed with birds. Today one can find those conditions in other lands where duck are in quantity and disturbance rare. In the lagoons of Mexico there are duck in uncountable millions and mosquitoes in mathematical abstractions. These birds will sit till you can poke them with a canoe paddle and the discharge of a gun causes temporary raucous alarm, but the bulk of birds settle again in a minute or so. These conditions suggest that the wild-fowler of the past, with his armament of punt cannon and nets and his enormous bags, was facing simpler and wholly unattractive conditions, where birds in the mass had not learnt that man was capable of killing at a distance. Even today professional fowlers, telling of the shooting of some unusual kind of duck, will often say how tame and reckless the stranger was, simply swimming away rather than taking to flight before his shot was fired. It is a matter for vain regret, but the loss of fowl in the past, usually attributed to reduction of the fens and the breeding area, was probably far more due to wholesale in-season and out-season slaughter for the market, not by sportsmen but by professional gunners and decoy and nets men.

Wild fowl are not indispensable articles of diet any more than are plovers' eggs. Rare wild fowl are only killed because they possess a market value for

skin collectors; rare breeding species are only robbed of eggs to appease the cravings of the oölogist.

Stuffed birds are hideous; collections of eggs of no value to science; and the collector is a menace to the sportsman because " the man with a gun " is always blamed for the misdeeds of the collectors' agents. The illegalising of the sale of birds, skins, or eggs, and the licensing and registration of existing collections, would remove the incentive of profit. So long as a bird is worth money it is in peril from the longshore loafer and wild-fowler. Rigid control of the trade and a penalising system of licenses and registrations would certainly " make the business more trouble than it is worth." A loophole could be left for scientists or responsible individuals associated with the great museums or the older university foundations, but bird protection is entirely in the interests of the sportsman, and it is high time that he realised that his enemies are not so much the anti-sport cranks as the skin collectors whose blood-money makes the shooting of rarities a low-class industry and the egg collectors who pay for clutches of rare birds' eggs.



XI

THE GUN ROOM—I

Chapter XI

THE GUN ROOM—I

THE gun room is really a very important room in the house, but it has no particular architectural place. In one house guns may be kept in a damp and gloomy basement, while in another they are honourably bestowed in the best part of the house and under their owner's eye. This is undoubtedly the better way, but one cannot lay down laws for other people's schemes of decoration. In practice one can house one's own shooting gear luxuriously and delight in it, but when five guests come with all their gear as well, your gun room, if it is part of your library, becomes overcrowded and something nearer to a harness room than the most philosophical of sportsmen can long endure. We must make some kind of a difference between the gun room and the gun-cleaning room, which serves for the storage of impedimenta and cartridges.

Today a good pair of guns cost as much as a first-class piano or a good average light car, and they will long outlast these if they are well cared for. The house on your shoot may be a modest and restricted shooting-box, or it may be a grandiose and inconvenient castle; so it follows that our gun room is a purely theoretical apartment, an abstraction of the mind having no precise parallel in true dimensional space, but rather like some of those delightful living-rooms of an older generation of sportsmen.

The first consideration is guns, and today we live in an age when design has standardised, but excellence of craftsmanship still endures. The normal game gun is a double-barrelled twelve-bore hammerless ejector. A pair will serve for all ordinary game shooting in a lifetime, and we only need special guns for special uses such as wild-fowling.

In the past days of muzzle-loaders there was a wonderful code which laid down different calibres or bores as indispensable for different kinds of game. Barrel lengths were also allocated to different birds, and the sportsman had to

equip himself with a prodigious armoury of the latest fashion. Barrels varied from thirty-four to forty-eight inches, though leading writers even in those days advocated a reduction to twenty-eight or thirty inches. Sixteen bore was *de rigueur* for partridge and cover shooting, while up to eleven bore and down to No. 15 was permissible for grouse, the author being careful to add that: "As much execution may be done with a No. 14 as a No. 13; the difference in shooting being so trivial as to be imperceptible; but in *two* sizes larger or smaller the extra strength of the one prevails over the other."

Today there is still a lingering idea among the less educated classes that a small bore will equal a twelve bore, but it is a contention that cannot be sustained in practice. A belief in long barrels still survives in the same classes, and it is difficult to convince a longshore man that a wild-fowling-piece of excessive barrel length shoots no farther or more strongly or closely than one of manageable size. It is an old idea, for in an essay on shooting, 1789, we find "the shortest [gun] was from thirty to thirty-four inches in barrel, and was employed for shooting in cover where a long piece would be inconvenient; whilst that for open country was from forty-two to forty-five inches in the barrel." Tests by the author in those days of indifferent black powder showed that "shot pierced an equal number of sheets of paper whether it was fired from a barrel of 28, 30, 32, 34, 36, 38, or 40 inches in length."

Today black powder is obsolete and we use the quicker and far more convenient smokeless. It has, however, taken nearly a quarter of a century to educate sportsmen to the fact that the old black powder lengths represent sheer waste of metal and excess weight. The tendency for today is for short twenty-five-inch guns in place of the thirty-inch pieces of the Victorians and the twenty-eights of the Edwardians. Guns could be made even shorter than twenty-five inches without loss of efficiency, but reduction of length below this means with modern powders a greater degree of report.

Today the leading makers will make guns with barrels of any length from twenty-five inches up to the old-fashioned thirty. Less skilled makers are loth to depart from the standards their workmen can accomplish, for if the barrels are simply reduced and fitted to an old action designed for long barrels, there is a loss of balance and a lack of proportion. In the best modern short guns the action is specially designed: the breech of the barrel is reinforced and the

whole gun is splendidly balanced, with the weight just where it is wanted between the hands.

One is often asked, Who makes the best gun? It is very much like being asked which is the best wine or the best motor-car. All one can do is to indicate a few really first-class makers whose work maintains their reputation. A man can make his choice in London today between Boss, Churchill, Holland and Holland, Lancaster and Purdey, or in Birmingham between Greener and Powell. There are many other good makers as well who turn out reliable hard-shooting guns, and there are provincial makers in Scotland and some of the larger county towns whose best work is held in very high estimation. There are also specialists in particular types of guns, like Ford or Lewis of Birmingham, whose wild-fowling guns are deservedly famous.

Guns are also made in different grades, although some makers only make one grade. The difference between a "best" gun and one of the cheaper varieties is not a matter of difference in shooting quality, but one of finish and refinement. This does not simply mean applied decoration, but a variety of small detail. The lock may be simpler and cheaper to make; the stock may be of less well-figured wood; there may be a dozen or more points where hours of labour spent on the best-grade gun have been saved with consequent reduction in selling price to the customer. The gun may be an ounce or two heavier; it will possibly lack absolutely perfect balance; but it will shoot as hard and as far and throw as reliable a pattern as the better gun.

It is wisdom to buy the very best, and if you can afford it a pair of the "best" are the finest investment. If your purse is shallower, you may have to be content with a cheaper grade, but the difference is at most a slight one, and you will not in consequence kill many fewer birds.

The essential is that not only should your gun be a good one, but it must be a perfect fit for you; for it does not matter how fine the gun may be, if it does not fit you and an inferior weapon does, you will shoot better with the poorer gun. The fit of a gun is determined best by trial and error at a clay-bird practice ground. It consists in adapting the stock of the gun and the trigger pull to compensate for your own individual peculiarities of build and style of shooting. The latter is just as important a factor as the former, and is all too often overlooked.

A gun-maker can tell from the general appearance and measures of a customer the stocking of a gun which will approximately fit him. In the case of a youngster whose muscles are not "set," refinement of fit is not very important. He will accommodate himself easily to any gun not varying widely from his own measures. A man of middle age requires most careful fitting if he is to do his best, and the fitting of a middle-aged novice is peculiarly difficult. The latter has not, so to speak, standardised his style of shooting, and in place of being able to compensate for particular errors the maker has no established style to correct, but is faced with a client whose shooting varies until he has found his own feet.

The ideal is to fit the gun to the client so that it becomes, so to speak, a natural pointer. If you point your finger at an object you align finger, eye, and object without conscious thought. If your gun fits, you will in the same way achieve this perfect alignment; and then, if your swing or muscular movement is free and unchecked and your trigger-pressing accomplished without a momentary pause and check of the gun, you will hit what you are looking at.

It is obvious that the better balanced, the lighter and more manageable the gun, the easier it is to reach this ideal. Good guns have this perfect sense of delicate handling, where cheaper, heavier arms are clumsy. A crude machine-made piece may only weigh half a pound or so more than a good gun, but it handles like a crowbar when compared to a fine hand-made weapon.

The English game gun is made in two types of lock: the side-lock and the Anson and Deely. In general, best guns are made with side-locks, but the rather less expensive Anson and Deely is quite as good and rather better for use overseas, as it is more robust. The side-lock makes a gun which is rather better balanced and rather more pleasantly shaped at the grip.

The standard cartridge is the twelve bore of two and a half inch length, but guns made for American clients are chambered for a case which is slightly longer, and the barrels are usually bored a few thousandths of an inch wider in the bore in order to get the best results with American loaded cartridges, which are slightly oversized as regards their wads when compared with the British and continental standards. The British standard twelve bore is between 0·729 and 0·739 inch, for wadding of 0·738 inch diameter. The American twelve bore is often oversize, and technically nearer to an actual eleven bore than a twelve. The English proof-house stamp shot-gun barrels with the bore and

the figures $\frac{1}{1}^{2}$ indicate that the bore is a big twelve, while the figures $\frac{1}{1}^{3}$ indicate that it is on the narrow side. In general, American cartridges perform best in the larger bore, as pressure is reduced and pattern improved.

A shot-gun, although we attribute it to one maker, is the result of the co-ordinated effort of many skilled craftsmen. The design of the action, the amount of metal left or removed, the ratios between the various parts—all these are the result of years of experience. Little by little new steels have become available; the standards of cartridge pressures and the proof tests have been raised; details of refinement have been incorporated; and a modern best gun by a progressive maker is very different in construction, though perhaps little altered in outward appearance, from the best gun made by the same maker a quarter of a century ago. There is in this quiet progressive change the work of the modern gun-maker who commands the skill of his workers and who adapts their skill to modern materials and the demands of the day. There must always be a skilled designing and directing brain behind the best work of any kind. The history of the gun trade shows many instances when businesses of good name have passed to strange or younger hands and there was no progress. They were content to make what they had made before; conservatism cloaked inability, and the death of old clients outbalanced any accretion of new ones. A name which was good in pre-war days may be a rapidly depreciating asset today, and the firms with little custom cannot command the service of the best craftsmen. The great gun-makers with their large turnover can keep their men and their outworkers at full pressure of work all the time. The second-class maker has perforce to be content with less good craftsmanship, for the best workers in the trade go to the firms where there is scope for their work. The best gun-fitters are very rare and command a high value, and in this as in all other aspects of modern gun-making, the best men go to the leading makers.

The purchaser of a gun does not have to face the depreciation effect which afflicts the buyer of a motor-car. There is no annual decrement, though age does affect values, and old guns with thirty-inch barrels are so out of fashion as to fetch very low prices compared with the modern short-barrel types. On the other hand, the name of the maker counts for a good deal, and a good modern second-hand gun or pair of guns by a good maker whose name still maintains its prestige command high cash values.

There are certain refinements applied to the game gun which are offered. Most makers supply single-trigger actions in which one trigger serves for both barrels. The advantage of this is that there is not that momentary slackening of the grip which inevitably accompanies the movement of the forefinger from front to rear trigger. The single-trigger is on the whole a slight asset, but many sportsmen still prefer the double-trigger, which is certainly more reliable. It is in the end purely a matter of personal preference. The very latest device is one of Churchill's. He is making a double-trigger gun, either trigger of which will act as a single-trigger and fire either barrel at will.

Another refinement sometimes offered is detachable locks. These are ingenious, but beyond offering additional opportunities for misguided tampering with mechanism, it is difficult to see what use the device serves.

The gun with the barrels placed under and over instead of side by side is the oldest form of double barrel known, and has had some transient vogue for trap-shooters. It has never, however, been able to get a following among sportsmen, for the system suffers from mechanical inefficiency if it is made light enough to be in any way comparable to a good standard side-by-side type gun. The average under-and-over gun tends to shoot itself loose; the gape at the breech to admit the cartridge to the lower barrel is inevitably twice as wide as in the side-by-side system, and there is inevitably a far greater area of bearing and wearing surface. Under-and-overs made by the best makers are undoubtedly interesting guns and very fairly reliable, but they are not in any way as reliable as the side-by-side type of equal standard of workmanship. Cheap under-and-over guns made in the main from continental parts are wholly worthless.

The price of guns runs from a hundred and twenty guineas or more down to about twenty-five guineas. Below this one can get machine-made or rough guns, and one can even buy cheap foreign guns of pleasing external appearance for well under ten pounds. These are not worth ten shillings.

As a good pair of guns will last a lifetime or more there is no reason to be unduly economical in this matter of first cost. If you can afford it, buy the very best; if not, buy at least the best you can afford. A good pair of plain Anson and Deeley action twelve-bore ejector guns made to fit you by a good maker, complete with all equipment cases, etc., can be obtained for a hundred guineas.

A good gun-maker has often in stock good second-hand guns of his own or other makers. You may be able to find something suitable among them, and they will have to be fitted to you. In any case never buy second-hand guns except from a good gun-maker.

For normal use the standard twelve bore is almost universal. The sixteen bore is lighter and suitable for ladies' use, but cannot fire the same number of shot to a load as the larger calibre. The twenty bore is best avoided, as there is an ever-present danger that one of the twenty-bore cartridges will be loaded by mistake into a twelve-bore lodge in the lead of the chamber, and allow a twelve-bore case to be loaded behind it. The consequence is a dangerous burst, and twenty-bore weapons and ammunition are best kept out of the gun room entirely.

For a boy's gun a sixteen bore is suitable and efficient; for a small boy's gun the little double-barrelled ·410 of English make is perfectly adequate, and will serve well until the boy is old enough to come out with his elders either with a sixteen bore or with a light twelve bore and light loads.

No less important than the gun is the cartridge. The old English firms of Eley and Kynoch and many other concerns are now merged in Imperial Chemical Industries, Limited. They are the only large factories making cases and shot-gun ammunition in the country. Many gun-makers, however, load their own cartridges, sometimes in Nobel cases, sometimes in foreign cases. The Remington U.M.C. load their own cases with English powder, and turn out a very good cartridge which has the virtue of being waterproof.

The general range of twelve-bore cartridges offered vary in price from 12s. 6d. a hundred for the cheap brands to round about a sovereign per hundred for the best. The difference in price is not so much a matter of variation in powder or shot as in the amount of metal in the case and the quality of the wadding used. Cheap cartridges are a doubtful economy, as they lack regularity and show far more irregular patterns. An extra brace of birds per hundred cartridges more than repays the difference in cost between the doubtful and the reliable, and you will certainly reap the benefit from the slight extra expenditure.

The British factory-loaded cartridges are on the whole very reliable, but the gun-maker's own special loads are often specially adapted to give the best results with his own guns. He also offers you a wider range of control of load, light loads with reduced recoil, heavy loads for particular purposes, and makes up

your prescription to suit your special needs. The margin between a good average cartridge and a special super-cartridge is a very narrow one—a question of perhaps 3 to 4 per cent. increase in efficiency. This may be important to the crack trap shot, but does not really much concern the game shot. Bad or weak cartridges are on the whole very rare, and the good gun-maker's or the ordinary English or American factory-loaded cartridge shows a good high all-round level. Foreign-made cartridges of the cheapest kinds may, on the other hand, produce very odd results owing to an unsuitable blending of components. The caps do not suit the powders, or the powder gives too high or too low pressures. The country gun-maker loading cheap foreign components also produces occasional doubtful batches, with alarming and disconcerting rather than dangerous results. Excessive recoil is always to be distrusted, and weak shooting if suspected can be roughly tested against other makes of cartridges loaded with the same size of shot by firing at empty cigarette tins. Comparative penetration is a fairly sound index and will disclose any marked weakness likely to affect the killing power on game at average ranges.

In the old days vast attention was paid to the minute variations in powder loads and shot. Today we have steadied down to fairly simple and effective standard loads. The powders in common use are E.C., Empire, Smokeless Diamond, and to a lesser extent Schultze. A few foreign powders such as Mullerite, Rotweiler, Coopal, and Walsrode are also used, and the American factories load their own special makes.

In general, the British load gives a rather lower pressure and equivalently less recoil than the average American twelve-bore load. It is no less efficient, and if you are to fire several hundred shots in a few hours any reduction of recoil will be welcome. The American load is excellent for use in a heavy gun and under less arduous conditions of continuous firing, but it is on the heavy side for grouse driving.

So far as the individual is concerned, his opinion on a powder is through the impression produced at the butt of his gun. The ballistician can with his instruments tell us the velocity of the charge, the pressure, and the recoil, but the latter is the only factor apparent to the sportsman. Recoil is ultimately connected with high pressures and high velocity, and we can choose either a high, a medium, or a low pressure load to suit our personal preference. I doubt

that high velocities kill more birds than the others, and it is only the shot of exceptionally quick perception who can note any material difference in the result. Medium and low velocities give greater regularity of pattern, and it is open to doubt whether the gain of velocity is not offset by a reduction in pattern, unless the special high-velocity loads are specially regulated to the gun in which they are to be used.

The range of velocities is limited to 1,250 feet per second at the high limit, and to round about 980 feet per second at the low limit. The average figure is taken as 1,100 f.s., but as proof guns are bored small the usual velocity in a game gun is rather less than this figure. If we increase our velocities over the top limit, we at once reach a point where atmospheric resistance increases to such an extent that the regularity of the pattern is destroyed. If we decrease our velocities much below the 1,000 f.s. level, we lose range and penetration, unless we use a large charge of very heavy shot which retains its killing power at long ranges.

Pattern is more important than velocity and is controlled by the degree of constriction or choke we give the muzzle portions of our barrels. If a hundred pellets are fired from a true cylinder barrel, only 40 per cent. of these will be found in a circle of thirty inches at forty yards. These will be so scattered that there will be blank spaces through which a bird could pass untouched by a pellet. If we constrict the muzzle slightly and produce a modified degree of choke, we increase the pattern—that is to say, we concentrate more pellets in the circle. A gun with slight choke is termed " improved cylinder," and will place 50 per cent. of the pellets in the circle. An increase of restriction to " half choke " will give us 60 per cent., and full choke will give 70 per cent. patterns. Choke also increases the killing range by keeping the pattern close.

In practice very little game is shot at forty yards, and twenty to twenty-five yards is about normal. The spread of pattern at twenty yards is probably the best test of a gun's utility for game shooting. An improved cylinder will cover with the whole charge a circle of twenty-six inches at twenty yards, but the concentrated discharge of a full choke is all inside a circle of sixteen inches. Full choke is therefore too concentrated for normal use, and is only used for wild-fowl guns where game is shot at much longer ranges, and sixty rather than forty yards represents the limit of normally effective range.

Convention gives a higher degree of choke to the left barrel than the right, on the assumption that the second barrel is fired at a bird missed with the first barrel and consequently farther away. There is nowadays not a great deal of reason to keep to the convention. Most birds are driven and killed in front of you, so the increased degree of choke for the second barrel is in point of fact illogical.

Shot sizes affect both range and penetration. No. 6 is the standard for all game, but No. 5 is necessary for old grouse strong on the wing in the latter part of the season. No. 8 is used for snipe alone, and the heavier shot from No. 4 to B.B. for wild-fowling.

The size of shot affects the number we get into our cartridge and the "killing chances" in any given shot fired. In the normal load of $1\frac{1}{16}$ oz. shot we have for No. 6 shot 289 pellets. Increase the size of shot to No. 5, and for the same load of $1\frac{1}{16}$ oz. we are reduced to 234 pellets, while No. 4 only yields 181. A charge of No. 8 snipe shot will run to the total of 483.

Small shot lacks mass enough to penetrate, and experience has shown that game cannot be killed cleanly at usual ranges by shot smaller than No. 6, as the light pellets lose velocity rapidly.

We can find room in our cartridge for $1\frac{1}{8}$ oz. of shot and sufficient powder and wadding. This makes a full load, increases our pellet chances, and is rather inclined to be unduly productive of recoil and gun headache if used for a long day's shooting. The light load of 1 oz. of shot is very pleasant for folk sensitive to recoil, but this is attained at some slight sacrifice of possible kills. The objection is, I think, theoretical rather than practical, for I know many men who never shoot with anything else and kill as much or more than the average.

In choosing a cartridge try it at the shooting ground when trying your gun. The usual trap loads used for clays are different, but it is wise to try a run of twenty-five rounds of two or three different loads and see if one suits you better than another. One man may find a quick high-velocity load suits him best; another may prefer a slower, more regular powder like Empire; another a bulk load like Schultze; but it is purely a matter of personal reaction. In general, a pleasant medium-velocity load suits most people best.

The wild-fowl gun of today is a special long-chambered heavy twelve bore, capable of taking paper cartridges three inches long. In the past—indeed the

recent past—a variety of ponderous pieces of shoulder artillery were used: these were four bores and eight bores and double eight bores of prodigious weight. Their value was that they threw a double-handful of heavy shot a long way, but it was found that the guns were so heavy to swing that they were useless except for sitting shots. Some genius discovered that one and a half ounces of shot could be loaded into a lengthened twelve-bore case, and the wild-fowl gun was born.

The earlier guns were known as "brass-case twelves," and fired a special thin brass case now no longer obtainable. This was equivalent to a ten bore and was a pleasant gun for experimental loads, but the modern wild-fowl gun takes the ordinary long three-inch twelve-bore paper case, and will fire all the intermediate sizes down to the short ordinary game cartridge. It should not weigh an ounce more than seven and a half pounds in good quality, but in very cheap or machine-made guns the weight may be eight pounds or over. The extra metal is needed for the sake of safety in these grades, but the recoil of a long-case three-inch twelve bore is not excessive when the gun has a rubber butt and weighs 7 lb. 7 oz.

The wild-fowl gun is not an expensive piece of artillery and should be as plain and simple as possible. Excess length of barrel is useless and only means extra weight. The old hammer type of gun is to be avoided, and a plain Anson and Deeley type or plain side-lock hammerless is best. There should be no engraving to collect mud, and a case-hardened finish eliminates a good deal of sand scratch.

The great point is the barrels: these should be full choked and really give the 70 per cent. pattern. Most good makers can add another 5 or even 10 per cent. to this with special loads, and regulation and a wild-fowl gun cannot shoot too close. Range is all-important.

The true range does not exceed sixty yards for reliable killing purposes, but shots at eighty yards or farther are occasionally brought off with large shot. The pattern at eighty to one hundred yards is wholly independable in spite of anything makers may allege.

For a short time a "chamberless gun" evolved by Doctor Heath was made for wild-fowling. It had no chamber but fired a long parallel thin brass case of *any length*. This has over-size wads, a low powder charge, and a terrific quantity

of heavy shot. It depended on the killing property of large shot at low velocities —this, as the boy with a catapult knows, exists. It was interesting rather than reliable, and has been abandoned by most people who tried the system.

The long paper case twelve-bore wild-fowl gun is the ideal piece for normal wild-fowling. The old ten and eight bores have occasional utility as goose guns but are dreadfully cumbersome. The twelve, on the other hand, is not very different from a game gun, and the extra weight barely noticed. It will, however, not do for game shooting, as the pattern is too close and it is specifically a gun of limited purpose designed for shooting at large objects at long range.

XII
THE GUN ROOM—II

Chapter XII

THE GUN ROOM—II

THE essential of a gun room is a cabinet of guns, and by the time you have got your own pair of game guns, or your pair of pairs, your wild-fowl guns, and a few small bores, you have the foundation of the affair; but it is by no means complete. One needs, for instance, a spare gun to lend to the inevitable enthusiast who comes with a double case and only finds later that he has but one gun inside it. The piece will do equally well for schoolboys and undergraduates, and though it actually fits nobody, it is remarkable how well most youngsters will shoot with any piece which is not cast-off or warped to an especial individual measure.

These guns need a cabinet or, at least, a rack in which they may be kept, and nothing beats for this purpose a good glass-fronted gun cupboard or cabinet. Unfortunately the trade varieties of these things are among the ugliest pieces of bad design that the joint taste of Tottenham Court Road and Curtain Road can inflict on anybody. The gun cabinet is usually hideous, worse than partly utilitarian in design ; they—God help them !—adorn the piece.

In the older days gun racks were often fitted inside the beautifully proportioned old Chippendale book-cases, and the lovely walnut of the stocks blended well with mahogany, astragal doors and the pleasant gleam of bookbindings. Today if you want a gun cabinet you can put with good furniture in your living-room, you have to design it and have it made ; or you may by luck come across a suitable table book-case with drawers or cupboards beneath which makes the ideal gun cabinet when the shelves are removed and replaced with proper racks.

If you are content to bestow your arms in a suitable case which need not be where it will always affront the eye, the Army and Navy Stores or similar places have as a rule practical, well-made, and utterly hideous oak and fumed-oak gun

cupboards lined with sombre baize and fitted with racks. A simpler type is the hanging wall cabinet with hooks beneath.

The reason for a gun cabinet is that, first, it is, if well-made, dry and damp-proof; secondly, the arms are always in view and the slightest spot of rust is at once detected. In many places valuable guns are left in their leather cases from the end of one season to the beginning of the next. It is all right if these cases are kept carefully in the dry and warm atmosphere of a gun-maker's store-room, but all too often they are put away in a harness room or a not too dry place. Still more frequently the case itself is damp. The guns may have been put back in cases with wet on them, or the cases are opened in rain, or wet gets into them while they lie in the boot of the car. Somehow or other damp gets in, and when the guns are taken out they are found to be rust-marked. The danger is not perhaps great if ordinary care is taken, but very often it is not, and if you are near the coast and sea air or sea water has to be contended with, gun cleaning has to be taken seriously. The barrels of guns used for wild-fowling are best protected by a coat of cellulose paint of suitable grey or green colour. The barrels should be scrupulously cleaned first, then wiped over with a rag dipped in acetone to remove all traces of oil, then brushed over or sprayed with cellulose. It does not improve the appearance, but it is workmanlike and saves a great deal of labour.

The gun cabinet has drawers for essentials, and you will need two kinds of oil: Three-in-One, or Rangoon, for metal on the gun, linseed oil for the wood-work. It is important to note that linseed or any "sweet oil" must never be used in the action or locks. For the metal-work we need a penetrating protective oil which remains fluid; for the stock and wood-work we need linseed oil, which soaks into the pores and grain and then turns into a hard gum. This preserves and waterproofs the wood-work and enables it to take a high polish. There is only one good polish for stocks—elbow grease.

In addition we shall need vaseline for storing guns away after the season is over, and if rifles find a place in the cabinet a tin of Young's Cordite Cleanser and a tube of Safety Paste.

Your gun-maker supplies cleaning rods with the guns in their case. These I always look on as case fittings and leave there, but in my gun cabinet I have several of A. G. Parker's "Country Life" celluloid-covered shot-gun cleaning

rods. These are fitted with special elastic horn jags and have no exposed metal about them. Packets of cleaning patches cut to the right size are supplied with the rods, and they save infinite time and trouble tearing up old rags to make pieces fit. One rod with various attachments will serve all purposes, but I prefer to have three, each for its proper use, as it saves a deal of unscrewing of mops and jags. The gun room of any big country house should have its own supply of cleaning rods, so that the dozen or more guns can be dealt with by the keepers without loss of time.

The process of cleaning barrels is to clean first with patches on a jag, then to oil thoroughly with Three-in-One on a special oily mop, then to clean with patches once again, and finish with a dry mop. The test for a perfectly cleaned barrel is that it show no trace of shot streaks or any cloudiness, and that a clear white silk handkerchief can be passed through it without showing the slightest dirt. This is counsel of perfection.

Old guns have often slightly rust-pitted bores. Where this has occurred "leading" sets up—that is to say, shot leave streaks of metal on the rough patches. To get this out a *brass* wire scratch-brush is used with plenty of oil, but the only permanent cure is to have the barrel relapped and polished. The scratch-brush should be used sparingly, but sometimes it is needed after a heavy day's firing. Shot vary very much and some loads set up a certain amount of leading in perfectly good barrels. The spring type Tomlinson cleaner with brass gauze pads is, I think, better than most scratch-brushes, and paraffin oil hastens the cleaning process, but must be carefully removed later. The points requiring special care are the leads in front of the chambers and the entry of the choke.

For use in the field a shot-gun pull-through with a bristle brush and oily rag is excellent. This can be dropped through and cleaning postponed till later. Cleaning may be left to others—usually is—but it is always well to make sure that it has been properly done and not scamped. The mechanism of a good gun should need no interference, but it is as well to have one or two really good fine-bladed turnscrews of different sizes available. These should be carefully edged and ground to fit the very narrow slots of the gun screws without burring the clean edges. The wild-fowler may need them after a night on the sand-dunes, where the wind drives blown sand into every crack and crevice of the

mechanism. Sand is the abomination of desolation, for it drifts down the barrels on to the top wads of the cartridges, and when these are fired cuts long scratches in the bore.

There are various other small accessories which find their place in the cabinet: snap caps, a position finder for drawing lots for place, cartridge extractors for jammed cases. Most of these are of little use, as if a case jams in an ejector you cannot get a grip on it. A short lead-plug half an inch in diameter and three inches long can be carried permanently in the cartridge bag. This dropped down a barrel will clear any normal jam. In addition to the proper leather cases we shall need, for moorland shooting, canvas or waterproof gun covers to take guns full length.

The ordinary gun case is made in several different qualities, and it is important that the case should be a really good one. Avoid the cheap canvas-covered type as they are never waterproof, and get either the best leather on oak in the case of the old long-barrelled guns, or, in the case of the new short-barrelled guns, the exceptionally convenient little motor-car cases made by Churchill. These are astonishingly light and compact and save a great deal of room in the car. The corners are rounded and the frame is leather on metal, and there is nothing which can scratch the car interior.

Cartridge magazines need to be strong and really well made, for they have to carry weight and stand hard usage. They are made in sizes from two to five hundred. The smallest are too small, the largest rather too big, and a pair of the three-hundred size is usually rather more convenient, particularly as the load can be distributed in a car. Such a magazine when full weighs about thirty pounds dead weight.

In addition to the magazines there are cartridge bags; these should be pig-skin and hold a hundred cases. They should also be well waterproofed with Mars oil, as nothing is more annoying than damp, swelled cases jamming in guns, and ordinary English cartridge cases are not wax waterproofed like the American varieties. The wild-fowler does not have to carry a great deal of ammunition, for his shots are infrequent. A bag is a hindrance to him, and a cartridge belt is about the best way of carrying a well-distributed load. Leather belts with spring clips are popular, but a really well-made all-leather belt is more flexible and comfortable. Game carriers and game bags also figure on our list. The

ordinary wood rack for carrying birds by their heads is perhaps the best type, but the old game bag with a net is capable of carrying a mighty content of "mixed bag" from field to game cart. The latter may be a special vehicle, but one of the most practical types can be improvised by mounting long "sawbucks," or sets of nail-studded rails, on any light farm waggon. The air should be able to circulate freely round the birds, and they should not be packed away in panniers or hampers till cool.

The panoply and gear of shooting is still fairly bulky today, but it is a far less arduous affair than it was in the past. Today we load a cartridge into the breech; in the muzzle-loading days this operation of loading involved separate flashes of gunpowder, and belts of shot of different sizes, loose wadding to be carried in the pocket, and either caps or spare flints. The gun-room of those days was a confused litter of shot-bags and gear, and to it their clung the specific sulphurous smell of black powder fowling and old gun oil, an enduring atmosphere that still permeates old gun rooms to this day.

The extent to which guns and gear should be in evidence is determined by the nature of the house and the personal predilections of its inhabitants. Sometimes one comes across a true shooting-box in which the element of sport is the dominant note in the interior decoration. Many small Scotch castles show this style, in which heads and antlers, old arms and sporting pictures figure. It is carried out to a greater extent on the Continent, and the first International Sporting Exhibition held in Vienna in 1910 was remarkable for some excellent reproductions of hunting lodges owned by great nobles. These lent some of their finest trophies, pictures, and objects of sporting art to the exhibition, which was a valuable lesson in what could be done to make a shooting-box not only comfortable but beautiful, while yet retaining its essential character.

Personally, I reckon a good book-shelf one of the essential gun-room fittings. It should hold the classics of sport as well as the newer books. We could put Abel Chapman's "Art of Wild-Fowling" and "Retrospect" beside old Hawker's "Instructions" and Folkard's "Wild-Fowling"; Sir Peter Mackie's "Keeper's Book" beside Speedy's "Sport in the Highlands and Lowlands"; Scropes's "Art of Deer Stalking" can neighbour Ross's "Book of the Red Deer"; the new volumes of the Lonsdale Library can go beside the old Badminton and the Fur and Feather series.

Then we need reference books: Saunders's "Manual of British Birds," Rowe's "Guide to the Game Laws," Churchill's "How to Shoot," Ward's "Game Animals of Africa" and Stockley's "Big Game Shooting in the Indian Empire," Alington's "Partridge Driving," Barton's "Pheasants," Shipley's "The Grouse in Health and Disease," and books on arms ancient and modern, on shooting and travel, hunting, fishing, and the chase.

When all is said and done, the best equipment in the world will not necessarily make you shoot any straighter or better. Shooting is essentially a matter of natural adaptability, and then practice; but though the written word can never teach you exactly how to do any act in which time and judgment and the eye—the hitting of a moving object—are involved, it is at least possible to lay down some pointers on the theory of missing.

At least ninety per cent. of shots missed are missed because we shoot behind or below the bird. We either fail to swing with the bird, or we check our swing at the critical moment, or our foot-work is bad and we lower a shoulder through constraint at the end of the swing, or we pause on the trigger but for some reason or other we lag at the instant of firing—and miss.

Sometimes even a good shot has an off day when he shoots badly. There is no general explanation of this: it may be liver, worry, alcoholic remorse, or lack of practice. When such a spell occurs it requires a charm to break it. One fairly reliable method is to point the left thumb at the bird instead of using it to grip the gun barrels; another is to imagine that each bird carries in its beak a stick a yard long with an orange on the end of it. Your task is to hit the imaginary orange. Once back into the swing you recover your proper form.

The novice learning to shoot must practise at clay pigeons at a shooting ground. He is fitted with a gun by his gun-maker, who measures him with a gun with an alterable stock or "try-gun." This device allows the gun to be built with the right length of stock and the right bend of stock, and the right cast-off, or relation of barrel axis to stock axis, so that the gun fits the individual. The try-gun is, however, not a perfectly infallible affair: it simply accomplishes the rough measurements of gun-fitting; but a good gun-fitter does a great deal more: he refines details of grip and comb, adjusts balance and trigger pull, and tunes the crude weapon built to the trial measurements into the perfect fit.

Game is shot with both eyes open and with no conscious or deliberate aim.

That is to say, there is no alignment of sights on the object as is the case with rifle-shooting. It is a case of shooting what you are looking at and co-ordinating vision and muscular control. To achieve this we have to consider gun-mounting (the action of bringing the piece to the shoulder), alignment, swing or maintenance of relative movement of the gun barrels with the moving object, and trigger pressure.

If we analyse the matter we find that the left hand is the natural pointer and that we shoot all our game over our left hand. Actually we point just as straight with our left as our right hand, and when we point we centre an object to our two-eyed vision. Years of not pointing with our left hand may to a certain extent make us slower in aligning the left on an object than the right, and I am inclined to think that a little practice even without a gun in hand at left-hand pointing is a very useful bit of preliminary exercise. A minute or so pointing practice in the morning is no trouble and helps co-ordination.

The modern style of shooting lays down that the trigger should be pressed precisely as the gun is butted to the shoulder. In a word, trigger pressure represents the end of the complex movement : the gun should not be butted to the shoulder, held there, the swing continued, and then fired. Actually, in the case of a crossing bird, the gunner looks at the bird and begins to lift his gun and pivot his body in the direction of the bird's movement. He should co-ordinate this so that, as he points his left hand toward and " with " the bird, the right hand pulls the gun butt in to the shoulder, and presses trigger as it butts.

To do this effectively proper foot-work is essential. The feet must be comfortably apart, not immediately behind one another, and as the gun is raised the weight of the body is transferred to the ball of the feet and toes. If the feet are awkwardly placed, swing is checked and the shot missed below or behind. No less important is grip. Many men hold their right hands badly and too far on top of their guns. As the right is the lifting hand, this should be well beneath rather than at the side of the grip. Attention to a uniform style of gun-mounting is the foundation of successful shooting, and above all a good, clean style.

The modern twenty-five-inch barrelled gun has one special advantage not found in the old kind. It has far less " flip " or depression of the muzzle when it is fired, and consequently delivers its charge of shot at least a foot above the line of sight. This means that in place of having to obscure a rising bird with your

barrels in order not to shoot below it, your game is normally always in sight. Actually one does not as a rule see one's foresight or barrels, but one becomes conscious of them immediately after a shot is fired. One should never look at the sight or along the barrels, but always at the bird's beak.

Various devices have been marketed for improving shooting, but no shot-gun sight of any kind has yet proved much use. Some forms aim at excluding the line of vision of the left eye, others lift the gun in the hand by additions to the fore-end. These types are simply crude devices which attempt to compensate for errors due to a badly fitted gun. The result is better achieved by altering cast-off or bend until the gun fits.

At the beginning of the season one may be out of practice and out of condition in the sense that one's shooting muscles are not in training. This muscular slackness certainly affects one's shooting, for one is slow and fairly easily fatigued. The remedy is to pay a visit or two to the shooting grounds and practise with fifty rounds to begin with, increasing to a hundred on the second or third day. In addition I believe in a little physical training in the bedroom on rising. Practise gun mounting while dressing, or have a gun handy and put in an occasional few minutes' practising mounting grip, stance, and swing. Care should be taken not to overdo it, and as your mounting should always be a straight and level lift, a vertical line such as the edge of a book-case or the corner of a room makes a suitable mounting mark.

Recoil plays an important part in shooting. Normally we do not notice it, but to many people it is apparent as " gun headache." This is caused by a cumulative series of small concussions, and the real remedy for it is to hold the head stiff on the neck. Biting an ordinary rubber elastic band between the teeth very often achieves this effect automatically, but the best cure is to seek out the powder or load which you find is individually the most tolerable to you. One man will find a quick powder suits him, another will prefer a slower, bulkier load. It is purely a matter of personal reaction to the recoil concussion. During the course of a long day one absorbs in recoil several thousand foot-pounds of energy. The lighter the gun the more recoil transmitted to the shooter. A twelve bore can be made to weigh as little as five pounds, but it is not a pleasant weapon to shoot as it is too light and recoil is noticeable. Today best guns weigh from five and three-quarters to six and a quarter pounds. A weight of 6 lb.

2 oz. is probably the happiest medium. A crude heavy gun becomes unbearable on a long day, but the bad balance of a gun is even more noticeable when fatigued than is its actual weight. A tired man will begin to miss badly with a gun whose weight is forward, and the short-barrelled gun with its centrally distributed weight scores heavily over the old long barrels in this respect.

Quite irrespective of shooting a novice must be taught how to carry a gun properly and how to behave. Usually a boy is taught this as part of his essential education, but when a man comes as a novice to shooting in middle age he should learn from the shooting ground not only how to discharge his piece but how to handle it. Shooting is on the whole far safer than motoring, but nevertheless accidents do occur. The main causes are dirt in barrels, excitement about woodcock, and shooting ground game in cover without remembering the beaters.

It is good to acquire certain automatic habits, such as looking through your barrels, to make certain they are clear before loading. Any obstruction in the barrels, such as mud or even snow, may cause a burst or at least a bulge, even if it does not completely block up the tube, and care is essential. Woodcock are dangerous because they fly so low and guns get unduly excited; rabbits in cover have got many beaters peppered. A novice will do well never to shoot at ground game until he has had some experience of field work. Shots above head-level are normally safe except in hill country, where special care may be needed, but it is always better to let any low shot go in case of doubt if you do not know where the beaters are. Excess of caution is never misplaced.

It is also important that loaders as well as guns know how to handle guns properly. Very often they are dangerously careless, and it is far better to take your man with you to a shooting ground or the gun club, and have him properly trained to load safely and change guns properly.

Lastly, perhaps, comes the matter which is so often forgotten. Good shooting depends largely on good foot-work, and it is important that your feet are free. The traditional shooting boot is a ponderous, heavy nailed affair, whose only virtue is that it is waterproof. Unless you are a giant avoid massive boots and content yourself with light brogues with a few nails, or light well-oiled boots of a similar nature. Comfort and freedom of action are indispensable, and your shooting clothes should be roomy and not drag. Tailors bother unduly about special free-swinging shoulder arrangements; the tip is to have the sleeves made

wider than usual, for however free the shoulder, it is the drag between coat and shirt that is the real restraining element. If your gun fits, your stance is correct, and your clothes free, you ought to be able to shoot game with the degree of skill you show at clay birds at the shooting ground. In practice you will find that you will not kill half as well, and in this perhaps lies the perpetual charm of shooting; if it were easy we should give it up, but as it is there are always some birds which will beat the really crack performer.

In the end it is not the bag which matters most, and it is better to shoot with a good clean style and get fewer birds than to shoot loosely and get more birds but more runners. There is always room for improvement in style, and a great deal can be learnt by an average shot by watching how really first-class shots take their birds. There are knacks of timing and selection of angle which make all the difference, but these, like all other matters of shooting, have to be learnt by experience and years of practice.

PRINTED IN GREAT BRITAIN BY
BILLING AND SONS LTD., GUILDFORD AND ESHER